Parker

REPORT

OF THE

ROCKVILLE CENTRE LABORATORY

OF THE

DEPARTMENT OF HEALTH

OF THE CITY OF BROOKLYN,

TO

Z. TAYLOR EMERY, M. D.,
COMMISSIONER OF HEALTH.

ON THE INVESTIGATION INTO THE SANITARY CONDITION OF THE BROOKLYN WATER SUPPLY

BY

HIBBERT HILL, M. B., *Biologist and Director,*
AND
JOSEPH W. ELLMS, *Chemist.*

E. H. WILSON, M. D., *Consulting Bacteriologist.*

BROOKLYN, N. Y.
STEVENSON & MARSTERS, STATIONERS AND PRINTERS,
391 Fulton Street.
1897.

TABLE OF CONTENTS.

BROOKLYN DEPARTMENT OF HEALTH.

COMMISSIONER'S OFFICE, 38 AND 40 CLINTON STREET,

BROOKLYN, December 15th, 1896.

Hon. F. W. Wurster,

Mayor.

SIR :

I have the honor to present to you herewith the report of the operations of the members of the Department at the Rockville Centre Laboratory, for the year 1897.

It is fitting at this time to recall the preliminary steps which have led up to the establishment of the laboratory and of the development of the plan of the work which has thus far been accomplished.

Early in the spring of 1894 I directed a systematic inspection of the water-shed constituting the drainage area of the water supply of Brooklyn, and early determined that some of the individual sources of supply seriously menaced the public health of this city.

It was found that Baiseley's Pond received the drainage of the village of Jameco, and chemical analysis showed it to be badly contaminated. Upon my advice that source of supply was cut out of service.

The condition of Horse Brook, supplying Hempstead Storage Reservoir, was also found to need serious attention, but the necessity for keeping up the quantity of the general supply did not admit of as summary treatment of this source of pollution as was possible in the case of Baiseley's Pond. The same was true of Springfield Pond and its feeders.

These and similar investigations of other sources of the water supply, led to the report of 1895 ; advising the establishment

of a laboratory for the exclusive chemical and biological examinations by the Department of Health.

In the beginning of 1892 the condition of the funds of the Department was found inadequate to carry out these recommendations upon the scale proposed.

A large number of chemical analyses were made of samples selected and delivered to this Department by the City Works Department.

Detailed inspections of the water-shed were continued throughout the year. A large number of bacteriological and microscopical examinations were also made.

This plan was believed to be unsatisfactory for the reasons which have been fully discussed in my annual report of 1895, page 168 to 171, and the following plan of work was outlined (page 171).

"I. Quantitative and qualitative bacteriological examination of the entire water-shed, beginning with the stations already mentioned and gradually including all the feeders. This work would have to be continued over a number of years to be of any value.

"II. Parallel chemical analyses; samples being taken at the same time as the bacteriological ones.

"III. A general examination of the higher flora of the water-shed, especially of bodies of still water where such growths are apt to alter the composition of the water and produce disagreeable tastes and odors.

"IV. Experimental work in filtration, to determine the best methods of purification of those sources of supply which may be already contaminated, but which, for economic reasons, cannot be discarded."

Owing to the still greater inadequacy of the Department funds in January, 1896, the work was limited to the lines of 1895, with the exception that we were unable to continue our inspections.

During the summer the tastes and odors of the water furnished to the city became extremely offensive, causing general dissatisfaction and uneasiness among our citizens.

Believing that you would sustain me under the emergency

act, I immediately caused a series of inspections to be made, together with chemical and biological examinations, in order to determine the specific cause and source of the tastes and odors, and their effects upon the public health. I reported to you September 8th, 1896, the results of these investigations together with recommendations for the proper remedy.

Promptly recognizing the importance of the situation and of my recommendations in view of the same, you authorized the expenditure of a sufficient sum to establish and carry on a laboratory at Rockville Centre for a representative and continuous investigation of the sources of the water supply.

The laboratory was established and put in operation in due course of time, and the results obtained during the first year's work are herewith transmitted.

Much has been accomplished, but more remains to be done, and I strongly urge the continuance of the work so well begun.

Respectfully submitted,

Z. Taylor Emery, M. D.,
Commissioner of Health.

ROCKVILLE CENTRE LABORATORY,
ROCKVILLE CENTRE, L. I.,
Dec. 1st, 1897.

To the
Honorable Z. Taylor Emery, M. D.,
Commissioner of Health.

Sir:

We herewith submit a report on the sanitary condition of the water supply of the City of Brooklyn, based on an investigation made by this Laboratory, pursuant to your instructions of October, 1896.

You directed that the water supply be examined analytically and by means of personal inspection for a period of one year, in order that the fluctuations, seasonal and otherwise, in the character of the supply might be studied, and that their real significance in relation to the sanitary condition of the supply might be determined.

Your instructions have been carried out, and it remains only to submit to you the results.

Respectfully yours,

HIBBERT HILL,
JOSEPH W. ELLMS.

INTRODUCTION.

ORGANIZATION OF THE ROCKVILLE CENTRE LABORATORY.

The Rockville Centre Laboratory was established by the Commissioner of Health of the City of Brooklyn in the month of October, 1896, for the purpose of investigating the sanitary condition of the Brooklyn water supply. This involved the obtaining of comparative and continuous records of analyses, chemical, microscopical and bacteriological, from each individual source of supply. Up to that time no extensive information of this nature was on record. Only by such data could the normal fluctuations of each supply at various seasons of the year and under various meteorological conditions be followed, and departures from the normal be detected.

The sanitary inspection of the water shed was also undertaken, in order that the origin of pollution as indicated by analytical results might be located, and recommendations made for the abatement of the same.

The site for the laboratory was selected as nearly as possible at the centre of the water-shed. Every provision for thorough equipment was made, and in December, 1896, the work was commenced.

In its earlier course the work was conducted by a resident biologist and a resident assistant chemist, responsible, respectively, to the chiefs of the Bureaus of Bacteriology and of Chemistry of the Brooklyn Department of Health. Early in July the Laboratory was organized by the Commissioner of Health on an independent basis in order to meet the increasing requirements of the work. The resident biologist was appointed as Director. The assistant chemist severed his connection with the Laboratory about this time,

and was succeeded by Mr. J. W. Ellms of the Massachusetts State Board of Health Laboratory, whose services were secured in July.

Dr. E. H. Wilson, Director of the Hoagland Laboratory, was appointed Consulting Bacteriologist.

The time allotted for the compiling of the report has been unavoidably short. Many points of special interest have been omitted, therefore, in order that the main object of the work, in determining the sanitary condition of the supply, might be exhaustively treated.

Especial attention has been given to the question of the *relative* purity of the present sources of supply in order that the problem of the future supply of Brooklyn may be better understood, and intelligent efforts directed to placing the supply on the best possible sanitary footing.

The report is submitted in two parts. The first part consists of descriptions of the sources of supply and synopses of the analyses made, together with the conclusions and recommendations based upon the whole work, so far as it has been carried.

The second part presents the methods followed in the conduct of the work and in the interpretation of results, together with tables showing the analyses in detail, and tables illustrative of special points.

REPORT

ON THE

WATER SUPPLY

OF THE

CITY OF BROOKLYN.

PART 1.

GENERAL DESCRIPTION OF WATER-SHED.

The drainage area which yields the whole of the Brooklyn water supply with the exception of that derived from a few driven wells at Gravesend and New Utrecht, consists of the level plains of the western end of Long Island, lying between a ridge of low hills on the north, and the Atlantic Ocean on the south. The eastern limit is, approximately, a line running north and south through the village of Massapequa. The western limit reaches East New York in the city of Brooklyn. The greater part of this area lies therefore in the county of Queens, and is divided into the towns, Oyster Bay, Hempstead and Jamaica on the south, Northampton and Flushing on the north. A nnmber of small streams, rising in the northern portion of this water-shed, flow southward towards the sea. The lengths and the drainage areas of these streams vary widely, the eastern streams being usually the longer. The removal of timber, drainage of swamps,and other accompaniments of advancing population, have reduced the western streams to mere brooks of three or four miles or less in length.

Some of these have been diverted into the Brooklyn Supply. From Rockville Centre eastward, five ponds have been formed

along the line of the southern division of the L. I. R., by damming streams at Massapequa, Wantagh, Newbridge, East Meadow and Millburn, constituting the water-shed.

From Rockville Centre westward, the supply is derived principally from streams formerly dammed for use as mill ponds. A conduit passes along the line of the ponds, receiving the water from them directly, on the new shed, and through branch conduits or pipe lines on the old shed. Those ponds situated north of the conduit, Massapequa, Wantagh, Newbridge, East Meadow, Hempstead Storage Reservoir, Hempstead Pond, Schodack Brook, Pine's Pond, Tanglewood Pond, Valley Stream Reservoir, Clear Stream Pond, Twin Ponds and Baiseley's Pond, and one, Millburn Pond, situated on the southern side, deliver their water by gravity.

Those situated on the southern side of the conduit, Smith's Pond, Watt's Pond and Springfield Pond, have their waters lifted by pumps to the conduit level.

At the western end of the new shed is situated the Millburn Pumping Station, with a capacity of from 50,000,000 gallons to 60,000,000 gallons per diem, designed to force the water of the new shed to the Ridgewood Pumping Station in East New York, and also connected with the Millburn Reservoir, situated about a mile to the westward. This reservoir was intended for the storage of surplus water from the new shed.

The sub surface soil of Long Island consists of different kinds of sand, gravel and clay, mixed in various proportions or arranged more or less irregularly in strata of varying depths.

Ground waters are naturally abundant in such a soil, and use of this source of supply has been made since 1883, when the plants at Clear Stream and Forest Stream were established. Since that time, driven well plants have been erected at Massapequa, Wantagh, Newbridge, Merrick and East Meadow, on the new shed, and at Watt't Pond, Jameco Park, Baiseley's, Oconee, Shetucket and Spring Creek on the old shed. All of these, except the five last mentioned, are south of the conduit line.

The Hempstead Storage Reservoir, situated north of Rockville Centre, was completed in 1877.

The water-shed, as here described, falls naturally into three sections.

The eastern section contains the ponds and driven wells east of Rockville Centre, namely:

Massapequa Pond.	Massapequa Driven Wells.
Wantagh "	Wantagh "
Newbridge "	Newbridge (Matawan) "
	Merrick "
East Meadow Pond.	East Meadow (Agawam) "
Millburn "	

The central section contains:

Hempstead Storage Reservoir.

Hempstead (De Mott's) Pond.

Schodack Brook.

Pines (Rockville) Pond.

Tanglewood Pond.

Smith's Pond (with pumping station).

The western section contains:

Valley Stream Reservoir.	
Watt's Pond (with pumping station).	Watt's Driven Wells.
Clear Stream Pond.	Clear Stream Driven Wells.
Twin (Simonson's) Ponds.	
	Forest Stream Driven Wells.
Springfield Pond (with pumping station).	
	Jameco Park Driven Wells.
Baiseley's Pond.	Baiseley's "
	Oconee "
	Shetucket "
	Spring Creek "

The division of the shed into these sections is based on their topographical relationship.

The eastern section is the farthest from Brooklyn, it contains the smallest population, and presents on the whole the most abundant woodland and swamp.

The western section is more thickly populated, and more under cultivation; it is largely cleared of timber, and swamps are comparatively few and small.

The central section presents conditions more or less intermediate between the other two as regards the features given above. This section contains at present no driven-well plants.

The engineering information given in the following synopsis has been obtained from reports of the Department of City Works, and from "Water Supply of Brooklyn"—Peter Milne. C. E., Proc. Am. W. W. Assn. 1896.

SYNOPSIS

—OF—

ANALYTICAL RESULTS.

MASSAPEQUA POND AND FEEDERS.

This pond, formed by building a low dam across the small stream called Massapequa, is situated 10.5 miles east of Rockville Centre, immediately north of the L. I. R. R., and of the Brooklyn conduit. It lies in the town of Oyster Bay, which is about 30 miles from Brooklyn, and is 22.3 miles distant from the Ridgewood Pumping Station at East New York. It is fed by two small streams flowing in a southerly direction towards the pond. The western feeder is a very short brook, which occasionally dries up during the summer months ; the eastern feeder is the main source of supply. These two streams pass through swampy ground, and like all the streams in this section have a sluggish current. The drainage area, which is sparsely settled, is flat and low, and covers 36.2 square miles. The water from the pond flows by gravity into the conduit which has its eastern terminus at this point. One waste weir carries off the surplus water from the pond. The area of the pond is 17.2 acres and it is said to furnish 3,900,000 gallons of water daily. Its capacity is stated as 31,000,000 gallons. Sources of contamination have not been found of such a nature as to form a sanitary menace, and a detailed description of the inspections made is unnecessary.

The water from the pond has been examined chemically thirty-two times between December, 1896, and October, 1897.

On account of the swampy character of the ground about the pond, the water at certain times takes considerable vegetable matter into solution. After periods of heavy rain this is shown by the yellowish-brown color of the water. Such a rain occurred during the month of July, 1897, when 10.31 inches fell between

the 10th and the 31st of the month. The color on the 19th of the month was 1.6, and it only fell to 1.4 by the 2nd of August.

The rainfall diminished during the month of August (4.12 inches rain for the month), and the color gradually disappeared. The two inches of rain which fell during the week of August 23d-30th does not seem to have materially affected the color or the oxygen consumed.

The odor of the water increased with the increase of color, and had that peculiar "decidedly vegetable" smell, so characteristic of colored waters having the origin above described. The comparatively sudden diminution of the color, as compared with many New England waters, shows the transitory effect of the heavy rains. It is only to be explained by the sandy character of the soil, which acts like a filtering bed in removing the vegetable coloring matter of the water passing through it. The water, in consequence, as is shown by the albuminoid ammonia determination, exhibits at certain times during the year the characteristics of a colored water, and at certain other times those of a colorless water.

The effect of the heavy rains in introducing vegetable coloring matter into the water, causes the albuminoid ammonia to rise as the color rises, and therefore the fluctuations are to a considerable extent coincident with the rain-fall. No effect on the albuminoid ammonia of the winter precipitation of rain and snow is evident, on account of the frozen ground preventing the passage of the water through it, and therefore giving no chance for the solvent action of the water on the decomposing vegetable matter in the soil. The albuminoid ammonia on February 8th was .0026 parts, but on June 10th, .0386 parts, and was as high as .0242 parts in August, thus showing the effect of the rain-fall during these latter months. The color had so far diminished by September 30th as to be only 0.12, while the albuminoid ammonia on the same sample was .0052 parts.

The albuminoid ammonia results group themselves as follows:

Percentage of	results	below .0100	[parts per 100,000]		= 40.6
"	"	between .0100 and .0150	"	"	= 25.0
"	"	" .0150 and .0300	"	"	= 21.8
"	"	" .0300 and .0400	"	"	= 12.6

The free ammonia ranges from zero to .0030 parts, the latter result being obtained on July 26th. The higher amount given above is comparatively low.

No nitrites have ever been found.

As the color and albuminoid ammonia decreases, as shown by the results between July 19th and October 1st, the nitrates increase, due to the filtering action of the soil by which the organic nitrogen is converted into the oxidized form of nitrates.

The following table of results taken from the records illustrates these relations :

1897.	Color.	Albuminoid Ammonia. (Parts per 100,000.)	Nitrates.
July 19th	1.60	.0328	.0070
July 26th	1.45	.0316	.0050
Aug. 2d	1.40	.0242	.0070
Aug. 9th	0.70	.0162	.0070
Aug. 16th	0.45	.0158	.0150
Aug. 23d	0.43	.0098	.0150
Aug. 30th	0.40	.0106	.0200
Sept. 13th	0.20	.0106	.0150
Sept. 30th	0.12	.0052	.0170

The oxygen consumed during this period also exhibits an intimate relation with the color. The mineral constituents of the water show it to be a soft water, having the usual variations. The majority of the results on total solids range between 3.80 parts and 5.00 parts, while the fixed solids are between 1.80 parts and 2.50 parts. The hardness as determined by the soap method is about 1.0 part. Two determinations of iron in the water gave .0100 parts, and .0120 parts, respectively. Such an amount is quite common in surface waters and is in no way objectionable.

A study of the chlorine shows very slight fluctuations in the amount present throughout the year.

The highest chlorine result obtained was on April 1st, when the sample contained 0.65 parts, the lowest was on July 26th, when 0.44 parts were found. Averages by months were as follows:

1897.	Chlorine [parts per 100.000.]
January	.55
February	.56
March	.60
April	.61
May	.60
June	.60
July	.48
August	.55
September	.57

In July the average of two analyses was 0.48 parts, probably the result of dilution by the heavy rains at that time.

The average of the thirty-two analyses gave 0.57 parts of chlorine, and doubtless represents approximately the normal chlorine of the water, for the year during which examinations were made.

The chemical examination of the feeders to Massapequa Pond has consisted in analyzing the water from the eastern stream eight times and from the western four times. They show no very marked peculiarities, and do not differ on the whole from the result obtained on the pond.

Twenty-eight microscopical examinations from January to October, averaged 35 organisms per C. C. The highest count obtained was 179 organisms per C. C., in May; the lowest, 3 organisms per C. C., in March. About seventy per cent. of the results were lower than the average.

Previous to the heavy rains of July and August, an average of 27 organisms per C. C. was obtained. During the heavy rains the average was 48 organisms per C. C. The average number of genera present was 6. Diatoms occurred in 93 per cent of the samples, Algae in 64 per cent, Infusoria in 80 per cent.

The total number of genera found was 42. No one genus occurred in 50 per cent. or over of the samples.

Massapequa Pond presents no extraordinary microscopial characteristics. During the period of observation organisms such as Asterionella, Anabaena, Uvella, Uroglena and Dinobryon, known to be capable of producing at times unpleaasnt odors or tastes, were found

never in significant quantities. For the whole period the counts were low, while the total number of genera found was large.

It will be seen that the amount of rain-fall affects the count considerably.

Thirty-one bacterial quantitative examinations from January to October show an average count of 567 bacteria per C. C. The highest count obtained was 2,500 bacteria per C. C., once in August, once in September; the lowest count was 140 bacteria per C C., in May. About 74 per cent. of the counts were lower than the average.

Previous to the heavy rains of July and August the average was 357 bacteria per C C.; for the subsequent period, 1,320 bacteria per C C.

General species work has not been carried on to an extent justifying final conclusions.

Thirteen examinations for intestinal bacteria were made; a positive reaction was obtained once, in May.

The eastern feeder of Massapequa Pond was examined eight times microscopically at its inlet.

The counts were higher here than at the outlet in six cases, and about the same in the other two cases.

The genera found included Diatoms, Ulothrix and Spirogyra in addition to those already enumerated as found at the outlet.

Eight bacterial quantitative examinations were made at the eastern inlet, three counts being lower than the corresponding counts on the outlet, four higher, and one about the same.

Four microscopical counts from the western inlet gave results uniformly lower than the eastern inlet; three of the four being higher than the corresponding counts at the outlet.

The effect of the heavy rain-fall of July and August is quite evident.

Four bacterial counts from the western inlet shows two counts higher than the corresponding counts at the outlet, two lower. The counts on the inlets compare reasonably well with each other in their fluctuations.

The results of all three forms of analysis on Massapequa Pond depend somewhat upon rain-fall, and to this extent are comparable with each other.

The other variations which each series of results present are in themselves comparatively slight, and it is not surprising to find that the variations in any one series do not correspond very closely with those of the other series.

The odor of the water recorded does not correspond with the number or character of the microscopical organisms found, and is to be traced to vegetable matters in solution, derived from the swampy soil through which the feeders run.

The bacterial counts are such as are reasonably characteristic, in their amounts and variations, of this class of water, and correspond with the chemical results in the fact that the latter also are reasonably characteristic of the same class of water. Special relationships cannot be traced, not because such relationships do not exist, but because they are of a character which do not yield features sufficiently striking to be readily recognizable without more minute investigation than has been possible in the course of this work.

WANTAGH POND AND FEEDERS.

Wantagh Pond, situated immediately north of the L. I. R. R., and of the Brooklyn conduit, has been formed by intercepting a small stream called Ridgewood by a low dam as it flows in a southerly direction towards the sea. The pond is a little over two miles west of Massapequa and is similar to it in character.

Its drainage area, which comprises 19.7 square miles, is like that of Massapequa, excepting that the ground is less swampy and includes more cultivated land.

It has two feeders, the eastern and the western, the latter being somewhat larger than the former. The pond furnishes 4,000,000 gallons of water daily, covers 16.7 acres, and has a capacity of 23,500,000 gallons.

The water flows by gravity into the conduit. Two waste weirs are provided for removing the surplus water, which flows into the sea.

The village of Wantagh is situated in the vicinity of the pond on the east, and a small graveyard somewhat over 300 feet from the pond on the west. Sources of contamination of sanitary significance were not found.

The water has been examined chemically thirty-two times between December, 1896, and October, 1897.

Its color on July 10th was .80, but diminished gradually during the subsequent months, as the following table shows :

	Wantagh Pond Color.	Rain-fall for Week preceding.
July 19th,	.80	4.76
July 26th,	.40	3.17
Aug. 2d,	.50	2.25
Aug. 9th,	.28	1.03
Aug. 16th,	.23	.81
Aug. 23d,	.23	.23
Aug. 30th,	.25	2.00
Sept. 13th,	.15	.00
Sept. 30th,	.15	1.17

The water gave a vegetable odor which diminished as the color disappeared.

The nitrogen as indicated by the albuminoid ammonia is a little high for the amount of color present.

The lowest amount of nitrogen as albuminoid ammonia was found on February 2d, when .0013 parts were obtained. The results during the winter and early spring months show less nitrogen present than later, when the spring rains began to have their effect, and during the rainy periods of summer months. The highest albuminoid ammonia obtained was .0287 parts on June 10th. The distribution of the albuminoid ammonia results is as follows;

Percentage of results below .0100 [parts per 100.000] = 43.7
" " between .0100 and .0150 " " " = 37.5
" " " .0150 and .0300 " " " = 18.8

The free ammonia is uniformly low, being .0012 parts or under, with one exception.

In only two instances are nitrites recorded, and in each case .0001 part was obtained.

The nitrates during July, August and September ranged between .0200 and .0330 parts.

The oxygen consumed followed the color closely.

The average amount of chlorine found during each month is as follows:

In no case are there less then two analyses averaged.

1897	Chlorine [parts per 100,000]
January	.52
February	.53
March	.57
April	.53
May	.56
Jnne	.53
July	.50
August	.54
September	.52

The average of the thirty-two analyses made between December, 1896, and October, 1897, gave 0.54 parts chlorine.

The total solids range between 3.80 parts and 5.80 parts and the fixed solids between 1.80 and 3.50 parts. The hardness determinations show it to be a soft water.

The results of two iron determinations gave .0120 and .0100 parts respectively.

The analyses of the water from the feeders to this pond indicate no very marked differences from those made on the pond.

Twenty-eight microscopical examinations from January to October, averaged 16 organisms per C. C. The highest count obtained was 95 organisms per C. C., in July, the lowest 1 organism per C. C., once in each of the months, February, April, May and June. About 64 per cent. of the counts were lower than the average.

For the period ending June 19th, the counts averaged 6 organisms per C. C. For the subsequent period the counts averaged 30 organisms per C. C., corresponding with the heavy rains of the latter period. The number of genera averaged 5.

Diatoms were found in 86 per cent. of the samples, Infusoria in 68 per cent.

The total number of genera found was 36.

No one genus occurred in 50 per cent. or over of the samples.

Wantagh Pond presents no extraordinary characteristics from the standpoint of the microscopical examinations. During the

period of observation, organisms were found known to be capable of producing at times disagreeable odors and tastes, such as Tabellaria, Uroglena and Dinobryon, but never in significant quantities.

For the whole period the counts and the total number of genera found were low. A general relation may be traced between the number of organisms and the rain-fall.

Thirty-three bacterial quantitative examinations from January to October show an average count of 382 bacteria per C. C. The highest count was 1,600 bacteria per C. C., in August; the lowest, 80 bacteria per C. C., in June. About 66 per cent. of the counts were below the average. For the period preceding June 19th the average count was 199 bacteria per C. C. For the subsequent period of heavy rain-fall the average was 825 bacteria per C. C.

General species work has not been carried on to an extent justifying final conclusions. Thirteen examinations for intestinal bacteria were made without a single positive result.

Seven microscopical examinations of the eastern feeder at its inlet show six counts higher than the corresponding counts at the outlet, one count the same. The genera do not differ from those of the outlet.

Seven bacterial quantitative examinations at the eastern inlet show uniformly higher counts than the corresponding counts at the outlet. The fluctuations correspond in a general way. The effect of the wet weather of July and August is evident.

Five microscopical examinations at the western inlet show counts uniformly higher than the corresponding counts at the outlet, and at the eastern inlet. The genera do not differ from those of the outlet.

Five bacterial quantitative examinations at the western inlet show four counts higher, one count lower, than the corresponding count at the outlet. The fluctuations do not correspond. The western inlet gives three counts higher than the eastern inlet and one count lower, out of four parallel determinations.

No close relationship between the results of the three forms of analysis are evident, although the general deductions from each are confirmatory of the others. All three correspond in their main fluctuations with rain-fall and hence with each other.

The vegetable odor of the water is not due to microscopical organisms, but to vegetable matter in solution, derived from the district through which the feeders flow.

NEWBRIDGE POND AND FEEDER.

Newbridge Pond, situated about one and a half miles west of Wantagh Pond, is much smaller than the former and has a drainage area of only 2.7 square miles. It lies immediately north of the conduit and was formed by building a low dam across Newbridge Stream.

It has but one feeder flowing through a partially cultivated country. The water from the pond flows by gravity into the conduit, and furnishes 1,100,000 gallons daily. Two waste weirs are provided for the escape of the surplus water into creeks flowing toward the sea.

Inspection of the pond and feeder shows nothing of direct sanitary significance.

The number of chemical examinations made between December, 1896, and October, 1897, was thirty-two.

The color of the water during the time determinations were made showed the effect of the July rains. The color subsequently diminished with the rain-fall. The water had the characteristic vegetable odor.

The albuminoid ammonia results follow the rain-fall fairly well, rising as the precipitation increases and falling as it diminishes.

The distribution of the albuminoid ammonia results is shown by the following table :

Percentage of results	below	.0100	[parts per 100,000]	= 50.
" "	between	.0100 and .0150	" "	= 31.2
" "	"	.0150 and .0300	" "	= 18.8

The free ammonia appears quite uniform, only rising above .0016 parts in one instance. No nitrites have been found.

The nitrates obtained during July, August and September were very uniform.

The oxygen consumed figures appear to follow the fluctuations in the color readings quite closely.

The average of the 32 chlorine determinations gave 0.65 parts chlorine per 100,000.

The averages by months beginning in January are as follows :

1897.	Chlorine [parts per 100,000].
January	.55
February	.61
March	.65
April	.70
May	.68
June	.68
July	.58
August	.63
September	.61

The total solids vary between 4.00 parts and 6.50 parts and the fixed solids between 1.90 parts and 4.00 parts. The water is quite soft as shown by the soap method for hardness. Two determinations for iron gave .0050 and .0160 parts respectively.

The eight analyses of water at the inlet show no marked variations from those obtained on the pond.

Twenty-eight microscopical examinations from January to October average 11 organisms per C. C. The highest count was about 48 organisms per C. C. obtained once in June, once in October; the lowest was 1 organism per C. C., in July. About 70 per cent. of the counts were lower than the average. The averages for the periods before and after June 19th do not differ materially from each other, nor from the general average. The number of genera averaged 4.

Diatoms were found in 90 per cent. of the samples examined. Infusoria in 53 per cent. The total number of individual genera found was 28. No one genus occurred in 50 per cent. or over of the samples.

Newbridge Pond presents no extraordinary characteristics from the standpoint of microscopical examination. During the period of observation, organisms were found known to be capable of producing at times disagreeable odors and tastes, such as Asterionella, Tabellaria and Dinobryon, but not in significant quantities. For the whole period the counts were low, and the total number of

genera were not relatively high. The effect of rain-fall was of a very transitory nature.

Thirty-two bacterial quantitative examinations from January to October averaged 396 bacteria per C. C.; the highest count was 3,600 bacteria per C. C., in August; the lowest, 70 per C. C., in July. About 84 per cent. of the counts were below the average. For the period ending June 19th the average count was 192 bacteria per C. C. For the subsequent period, the average was 1,141 bacteria per C. C. The effect of rain-fall on the bacterial counts is more marked and lasting than on the microscopical counts for the same period.

General species work has not been carried on to an extent justifying final conclusions. Ten examinations for intestinal bacteria show one positive reaction.

Eight microscopical examinations at the inlet of the feeder yield five counts higher than the corresponding counts at the outlet, one lower and two about the same. The genera found in addition to those enumerated at the outlet were Ceratoneis, Oscillaria, Conferva, Euastrum, Arcella and Rotifer.

Eight bacterial quantitative examinations at the same inlet yield five counts higher than the corresponding counts at the outlet, one lower and two about the same. The fluctuations do not correspond with those of microscopical organisms, however. The effect of the heavy rain-fall of July and August is evident.

No marked relations exist between the fluctuations in the results of the three forms of analysis, except that all are affected in a general way by the rain-fall. The odor of the water is not traceable to the microscopical organisms found, but to vegetable matter in solution derived from the swampy land through which the feeder runs.

EAST MEADOW POND AND FEEDERS.

This pond lies immediately north of the conduit, somewhat less than a mile and a half west of Newbridge Pond and was formed by building a low dam across the small stream, East Meadow, which rises five or six miles to the north. A short stream also enters the pond on its northeastern side. The drainage area is approximately

26.7 square miles in extent, and has the same general character as those of the ponds previously described.

Several smaller ponds are to be found in the course of the main stream, which drains a low swampy region. The supply ponds themselves contain large growths of aquatic plants, sedges, etc., during the summer months. The current in both the feeders is extremely sluggish.

The area of the pond is 16.7 acres and yields about 6,300,000 gallons daily. The water flows by gravity into the conduit.

Inspection of the feeders show inhabited dwellings, few in number but close to the banks of the ponds and streams feeding into the supply.

Thirty-two chemical examinations have been made of the water from this pond during the nine months between December, 1896, and October, 1897.

The color of this water during the months of July, August and September showed fluctuations due to rain-fall.

The odor of the water has often been unpleasant and sometimes disagreeable. This is probably partly due to the rank vegetable growths in the series of small ponds from which the supply is derived.

The nitrogen as free ammonia was low, but at times it rose to quite an appreciable amount. The free ammonia was at its highest in the winter months of January and February, and during the summer months of July, August and September.

The albuminoid ammonia results group themselves as follows:

Percentage of results	below	.0100	[parts	per	100,000]	=	50.
" "	between	.0100 and .0150	"	"	"	=	25.
" "	"	.0150 and .0300	"	"	"	=	25.

The highest results were obtained in June, July and August, immediately following the heavy rains of that period.

Nitrites have been found twice, but never over .0001 part.

The nitrites are fairly uniform, ranging between .0170 parts and and .0350 parts from July to October.

The oxygen consumed varies with the color and in the usual ratio.

The total solids range between 3.80 parts and 5.50 parts and the fixed solids between 1.60 parts and 3.50 parts. The hardness determinations show that this is a soft water.

The average of the thirty-two chlorine determinations gave 0.61 parts of chlorine.

The averages of the chlorine determinations by months are as follows :

1897	Chlorine [parts per 100,000]
January	.57
February	.55
March	.61
April	.62
May	.65
June	.53
July	.56
August	.63
September	.59

Two determinations of iron gave respectively .0200 parts and .0100 parts.

The eight analyses of the feeder at the inlet to the pond gave no distinct variations from those obtained on the pond.

Twenty-two microscopical examinations from January to October averaged 16 organisms per C. C. The highest count obtained was 190 organisms per C. C., in January ; the lowest, 1 organism per C. C., in August. About 70 per cent. of the counts were below the average.

Previous to June 19th the average count was 23 organisms per C. C. Omitting the first count of the series, which is exceptionally high, the average for this period becomes 15 organisms per C. C. For the period subsequent to June 19th, the average is about 7 organisms per C. C. Diatoms were present in 86 per cent. of the samples, Infusoria in 70 per cent. The average number of genera was 5. The total number of individual genera found was 22. No one genus occurred in 50 per cent. or over of the samples.

East Meadow Pond presents nothing unusual from the standpoint of its microscopical contents. The connection between the rain-fall and the count is not marked. In fact, the average is lower during the heavy rains than before.

The counts on the whole low, and the number of individual genera is not particularly large.

Tabellaria, a diatom capable of producing odors in water of a disagreeable nature was found, but in quantities too small to be of importance.

Thirty-four bacterial quantitative examinations from January to October averaged 509 bacteria per C.C., The highest count obtained was 2,100 bacteria per C. C., in August; the lowest, 95 bacteria per C. C., in April. About 70 per cent. of the counts were lower than the average.

Previous to June 19th, the average was 287 bacteria per C. C. The average for the subsequent period was 1250 bacteria per C. C., showing a marked increase in relation to increased rain-fall.

General species work did not give results sufficiently extensive or detailed for final conclusions except in the case of one organism, which was satisfactorily indentified as a variety of the bacillus prodigiosus. Ten examinations for intestinal bacteria were made, three yielding positive reactions.

Seven microscopical examinations at the inlet of the western feeder show three counts higher than the corresponding counts at the outlet, one lower and three about the same.

The genera found in addition to those enumerated as occurring at the outlet were Asterionella, Cosmarium, Scenedesmus, Spirogyra, Actinophrys, Glenodinium, Synura and Trachelomonas.

Seven bacterial quantitative examinations at the same inlet yielded five counts higher than the corresponding outlet counts, two lower.

The effect of the heavy rain-fall in July and August is evident.

The relationship between the three forms of analysis is here somewhat apparent. While no close relation between the smaller variations in the three series of results has been traced, a general relation to rain-fall, and hence to each other, obtains.

It is to be noted that in January and February, and again in July, August and September, the free ammonia was relatively high as compared with the remaining portion of the period of observation, and that the bacterial counts for the corresponding periods were also relatively high.

The odors obtained from the water have been attributed to the

larger aquatic vegetable growths, and the absence of microscopical organisms in sufficient numbers to account for the presence of odors, is confirmatory of this conclusion.

MILLBURN POND AND FEEDER.

Millburn Pond, situated about two miles west of East Meadow Pond, is formed by intercepting Millburn stream by a dam, about a mile from where it empties into the sea. It lies immediately south of the conduit and of the L. I. R. R. The water flows by gravity into the pumpwell of the Millburn Pumping Station.

It has but one feeder, which drains an area of 3.2 square miles, and includes in it considerable cultivated land.

The pond furnishes 2,400,000 gallons daily and has an area of 13.8 acres. One waste weir is built into the embankment at the southern end of the pond.

Inspection showed that an inhabited dwelling with stables and outbuildings was situated close to the western bank of the pond itself. The village of Millburn lies in its vicinity on its western side.

On the feeder were found also a small number of inhabited dwellings, which with their outbuildings form a possible source of pollution.

Near the head of the feeder lies the Greenfield Cemetery.

Thirty-three chemical examinations of the water from this pond have been made. It has had little odor, turbidity or sediment and the color has been low, for the time during which it was determined.

The free ammonia ranges between .0002 parts and .0024 parts.

The albuminoid ammonia was as low as .0014 parts in December, 1896, and rose to .0334 parts in July, 1897.

The albuminoid ammonia results group themselves as follows:

Percentage results	below	.0100	[parts per 100,000]	= 54.5
" "	between	.0100 & .0150		= 33.3
" "	"	.0150 & .0300		= 12.2

The oxygen consumed follows the color in its variations.

Nitrites were found several times during the months of August and September, ranging between .0001 parts and .0005 parts.

The nitrates found during July, August and September are rather high, ranging between .0400 parts and .0670 parts.

The thirty-three determinations of chlorine averaged 0.73 parts per 100,000. The averages by months are as follows:

	Chlorine [parts per 100,000]
January	.77
February	.75
March	.74
April	.70
May	.75
June	.77
July	.69
August	.73
September	.72

The total and fixed solids as determined during the investigation are somewhat higher than were obtained from the other ponds of this section, and the hardness is slightly higher also.

Two determinations of iron gave .0070 and .0050 parts respectively.

The eight chemical analyses of the feeder to Millburn Pond are similar in character to those of the pond itself.

Twenty-six microscopical examinations from January to September averaged 24 organisms per C. C. The highest count obtained was 138 organisms per C. C., in September; the lowest, 1 organism per C. C., once in May, once in August. About 80 per cent. of the counts were below the average. Previous to June 19th, the average count was 23 organisms per C. C. For the subsequent period the average was 15 organisms per C. C. The average number of genera was 5. Diatoms occurred in 90 per cent. of the samples, Infusoria in 65 per cent.

The total number of individual genera found was 37.

No one organism occurred in 50 per cent. or over of the samples.

Millburn Pond presents nothing extraordinary from the standpoint of microscopical examination.

The average count was low, the total number of genera found somewhat high.

The increased rain-fall of the second period of observation corresponds with a decided diminution in the count.

Organisms capable of producing disagreeable odors and tastes, such as Asterionella, Tabellaria, Dinobryon, Synura and Spongidæ were found, but not in significant quantities.

Forty-six bacterial quantitative examinations from January to October averaged 532 bacteria per C. C. The highest count was 3,000 bacteria per C. C., in July, the lowest 150 bacteria per C. C., in June.

About 74 per cent. of the counts were below the average.

Previous to June 19th, the average was 411 bacteria per C. C. For the subsequent period, the average was 1,125 bacteria per C. C.

General species work was not sufficiently elaborated to yield results of final value.

Ten examinations for intestinal bacteria were made, yielding one positive result.

The relation of bacterial counts to rain-fall is evident.

Eight microscopical examinations of the feeder at the inlet show one count higher than the corresponding count at the outlet, five lower and two about the same.

The genera found in addition to those already enumerated at the outlet were Gomphonema and Spirogyra. There is no evident relation to rain-fall.

Seven bacterial quantitative examinations at the inlet show seven counts higher than the corresponding counts at the outlet, one about the same. The counts on the inlet correspond closely with the rain-fall for the same period.

A general relation obtains between the variations in the bacterial and chemical results as compared with the rain-fall. Free ammonia and bacterial counts are relatively higher at three periods, in January and February, in May, and in July, August and September.

The odor obtained was vegetable. The absence of microscopical organisms in sufficient quantity to account for this odor, points to its origin from dissolved vegetable matter, derived from the low land drained by the feeder.

A comparison of the nitrates, microscopical organisms and bacteria, as found at the inlet and outlet of the pond, shows a general tendency towards the following relations.

The bacteria and the nitrates are usually higher at the inlet than at the outlet, the microscopical organisms are higher at the outlet than at the inlet.

MILLBURN PUMPING STATION.

This pumping station is situated at the northern end of Millburn Pond and immediately north of the southern division of the L. I. R. R. The brick conduit which collects the water from the driven well plants and ponds east of Millburn Pond, terminates at this point. The water flows by gravity into the pump-well at the terminus of the conduit. The water from Millburn Pond is also admitted to this well and is pumped together with the water entering from the conduit through a forty-eight inch main direct to Ridgewood Engine House, a distance of 79,000 feet.

The water may be diverted so that it passes through a thirty-six inch main to the gate-house at Pine's Creek. Pipe connections are also provided for between this pumping station and Millburn Reservoir.

This reservoir was built for the purpose of storing the surplus water of the supply obtained east of Millburn, instead of allowing it to waste in times of high water as had been previously done and as is done now.

The reservoir covers an area of 76 acres and was to have 56 acres of water area when full.

Its capacity was to be 402,875,000 gallons.

On account of defects in its construction the reservoir has never been water-tight, and therefore never has been used.

Thirty-three samples of water collected from the tap in this station were analyzed chemically between December, 1896, and October, 1897.

The color of the water gradually diminished from .75 to .12, from the 19th of July to the 30th of September. Turbidity and sediment were very slight during the above period, and the odor was usually vegetable in character. The odor is recorded once as grassy and once as earthy.

The free ammonia was uniformly low, ranging between zero and .0028 parts, averaging only .0006 parts. The albuminoid ammo-

nia, which was .0008 parts on January 5th and rose to .0242 parts on the 16th of July, was on the whole quite low. The higher results were due to the heavy rains of July, which caused the albuminoid ammonia to rise to such high figures in the eastern ponds.

The albuminoid ammonia results may be grouped as follows :

Percentage results below	.0100 [parts per 100,000]	= 72.7
" " between	.0100 and .0150	= 18.1
" " "	.0150 and .0300	= 9.0

Nitrites were obtained once in the thirty-three examinations, and the quantity was then only .0001 part. Nitrates, between July 19th and the October 1st, ranged from .0230 parts to .0500 parts. There seemed to be a tendency towards a gradual increase during July, August and September.

The oxygen consumed followed the changes in color fairly well.

The total solids varied between four and six parts, and the fixed solids were about three parts. The average of nine hardness determinations gave 1.2 parts.

The average of the thirty-three chlorine determinations was .70 parts, and the averages by months were as follows :

	Chlorine [parts per 100,000]
January	.67
February	.75
March	.63
April	.65
May	.66
June	.65
July	.59
August	.65
September	.60

Two iron determinations gave .0070 parts and .0050 parts respectively.

As has been previously stated, the water taken from the tap in the Millburn Pumping Station represents the mixture of the surface water from the five eastern ponds and the ground water from the driven well plants situated south of the conduit and east of Millburn. As no data are at our disposal relative to the proportionate

amounts of water derived from each of these several sources, it is not worth while to more than present the results as given above.

Thirty-two microscopical examinations from Januaryto October show marked fluctuations, ranging between 1 organism per C. C. and 57 organisms per C. C. There is no definite relation between weekly averages of counts of organisms found on the water-shed supplying this pumping station and the counts obtained at the pumping station itself for corresponding periods.

It is probable that the action of the pumps themselves in disintegrating the microscopical organisms may affect the results. Moreover the pump-well contains a mixture of surface and ground water exposed at times to light, admitted by removing one of the plates covering the well ; at such times it is possible that some small amount of multiplication may obtain in the pump-well.

Furthermore the admission of water to the conduit from a height of some feet, at those points where the pipes from the driven-well plants deliver into it, causes considerable agitation of the water already present in the conduit at those places.

Massapequa Pond water is subjected to this agitation five times in the course of its flow from Massapequa Pond to Millburn Pumping Station, when all the driven well plants are in service. Wantagh Pond water is subjected to a similar agitation four times, Newbridge Pond water twice and East Meadow Pond water once under the same circumstances.

Changes in the service of the different plants on different days variously affect these conditions and allow a large number of possible combinations to arise.

The five driven-well plants, at Massapequa, Wantagh, Newbridge, Merrick and East Meadow, built under the Edwards–Monahan contract, were sources of supply during part of the period of observation. The ground water derived from these plants has been practically free from miscroscopical organisms, so that the whole amount of surface water reaching the pumping station on any given day is diluted, as far as its microscopical contents is concerned, by that amount of ground water which may have been pumped on the same day.

Records made by us of the service of the several supplies cover only those days when samples were collected from them, and do not

therefore form more than a very rough outline, insufficient for complete deductions.

Actual observation has shown that at times back flow from the conduit occurred into Newbridge Pond, and from the Millburn pump-well into Millburn Pond; it is not in evidence that similar back flowage may not have occurred at other points. This back-flow water probably sometimes consisted of nearly equal mixtures of surface and ground water, sometimes of surface water with but a small quantity of ground water, sometimes of ground water alone or nearly so.

Such back flowage tends to modify the counts obtained at the ponds where it occurred.

These considerations prevent any close comparisons between the analyses made at Millburn Pumping Station and those made on the several sources of supply.

Averages have not been attempted.

Fifty bacterial quantitative examinations were made from the water pumped at Millburn, taken from a tap on one of the engines in the Pumping Stations between January and October. Previous to June 19th, the highest count was 540 bacteria per C. C., in May, the lowest, 46 bacteria per C. C. in April.

For the period of heavy rain-fall, the highest count was 1,000 bacteria per C. C, in September; the lowest, 200 bacteria per C. C., in July.

During the first period of observation, especially in the earlier months, samples were collected two or three times each week and showed remarkable fluctuations, even in the same week.

The factors which are probably responsible for these fluctuations have already been discussed.

After June but a small proportion of ground water reached Millburn Pumping Station, and the results obtained during this period do not differ so widely or constantly from the average results on the ponds for the corresponding weeks, although they are still somewhat lower, as a rule.

Thirty-seven bacterial examinations for the period from January to June, of the water entering the Millburn pump-well, parallel with examinations of water from the tap in the Pumping Station, show close agreement with the latter.

Ten examinations for intestinal bacteria yielded one positive result in May.

HEMPSTEAD STORAGE RESERVOIR AND FEEDER (HORSE BROOK.)

Hempstead Storage Reservoir lies a little to the north-east of the village of Rockville Centre. It is about two miles in length, with an average width of less than a quarter of a mile. Horse Brook flows into the reservoir at its northern end. The brook is less than two miles in length and flows in a general south-westerly direction.

The reservoir has a direct pipe line connection with Hempstead (Demott's) Pond. Provision is also made for conducting the water around Hempstead Pond through a pipe line connecting with that of Schodack Brook. The latter pipe line enters the branch conduit which leads from Hempstead Pond to the main conduit. This branch conduit joins the main conduit near the head of Smith's Pond.

The drainage area comprises 25.79 square miles and includes the large village of Hempstead, which lies within a mile of the northern end of the reservoir, and the small village of Mineola situated two or three miles to the north.

Cultivated land is to be found on both sides of the reservoir and quite an extent of low marsh land at its head, through which flows Horse Brook.

The construction of this reservoir was commenced in 1872 and was completed in 1877. It was prepared by broadening and deepening a series of small ponds which lay above Hempstead Pond, until the estimated capacity of the reservoir was 1,055,000,000 gallons.

The estimated yield is about 5,000,000 gallons daily.

Thirty-three samples of water collected at the gate house at the southern end of the reservoir have been examined chemically during this investigation.

The color during the summer months ranged between .03 and .10.

The odor has been vegetable in character, sometimes grassy, and occasionally earthy or mouldy. The turbidity and sediment have been very slight except in two instances, when considerable sediment was observed.

The nitrogen as free ammonia varied between zero and .0050 parts, but seventy-three per cent. of the determinations showed less than .0012 parts.

The albuminoid ammonia, like the free ammonia, was lower during winter and early spring months than during the summer months. In grouping the results the following distribution was obtained:

Percentage results below .0100	[parts per 100,000]	= 39.4
" " between .0100 and .0150		= 21.2
" " " .0150 and .0300		= 39.4

The large percentage of albuminoid ammonia results between .0150 and .0300 parts is quite significant, when the very low color which this water usually has, is considered.

Nitrites have been found in over 63 per cent. of the thirty-three determinations, ranging between .0001 part and .0014 parts. Forty-five per cent. of these results were .0004 parts or over.

Nitrates varied between .0270 parts and .0500 parts, with an average of .0387 parts during the time between July 20th and October 1st.

The oxygen consumed results are low and were quite uniform for the time during which determinations were made.

The residue on evaporation was from 4.00 parts to 6.00 parts on the filtered samples, and the fixed solids were between 3.00 parts and 4.00 parts.

The hardness ranged between 0.9 and 1.6 parts as determined by the soap method.

From the thirty-three chlorine determinations an average of 0.67 parts were obtained.

The averages of the chlorine results by months were as follows:

	Chlorine [parts per 100,000]
January	.67
February	.68
March	.61
April	.65
May	.70
June	.71
July	.64
August	.68
September	.70

Two iron determinations gave zero and .0050 parts respectively.

Hempstead Storage Reservoir Feeder, Horse Brook.

This brook, which empties into the reservoir at its northern end, flows directly through the village of Hempstead. In the business section of the place many of the buildings which stand very close together along its banks, in some places actually overhang them. Above the business section are to be found several dwelling-houses, some of whose outbuildings and stables stand from twenty to thirty feet from the banks, and in some cases even nearer.

A small pond lies in the course of the stream on the northern side of Fulton Street, and between Fulton and Front Streets are situated the Hempstead Gas Works, close to the western bank of the brook.

The village of Hempstead has no sewerage system. Surface drainage readily finds its way into the feeder and at various points pipes are so laid as to conduct street drainage directly into it. The Department of City Works of Brooklyn have made arrangements for the cleaning of certain streets in order to prevent, as far as such a method will, the pollution of the feeder from this source.

The closets are not panned excepting immediately along the line of the feeder, where it has been undertaken by the Department of City Works.

Eight chemical analyses of water at the inlet to the reservoir have been made, and besides these, seven others at different points in the course of the stream for special purposes.

The water taken at the inlet to the reservoir showed little color as a rule, although it was sometimes turbid. Considerable sediment was observed at different times.

The peculiar feature of the odor determinations was the distinct tarry odor observed in all the samples taken during August and September. This is the result of the contamination of the brook about a mile above where the samples were collected, by the tar liquor which escapes from the tar well of the Hempstead Gas Works.

This will be more fully explained below in relation to some special work done in October.

The free ammonia, is with one exception, very high, ranging between .0070 parts and .0635 parts. Seventy-five per cent. of the results are above .0300 parts.

The albuminoid ammonia figures vary between .0070 parts and .0340 parts. The nitrites also show the evidences of contamination, and range between .0008 parts and .0052 parts, 87.5 per cent being above .0020 parts.

Nitrification is evident in spite of the large amount of unoxidized or only partially oxidized nitrogen. The nitrates vary between .1700 parts and .3500 parts, 75 per cent. of them being between .2000 parts and .3000 parts.

Determinations of the residue on evaporation gave for the month of August and September results varying between 10.90 parts and 13.20 parts.

The fixed solids averaged 8.60 parts and the hardness 2.6 parts for the same period. The average of the eight chlorine determinations made on samples taken at the inlet to the reservoir gave 1.43 parts. The chlorine was never lower than 1.00 part, nor higher than 1.60 parts.

One determination of iron gave .0070 parts.

In order to trace the effect of the pollution more closely a series of samples were taken at different points on the brook in the village of Hempstead, as given below.

Sample No. 1, Horse Brook. Sample collected from small pond north of gas works on Fulton Street.

Sample No. 2, Horse Brook, about 1,000 feet from the place where the first sample was taken, at the Front Street culvert, and below the gas works.

Sample No. 3, Horse Brook, about 1,000 feet below Front Street culvert in the business section of the village.

Sample No. 4, Horse Brook at small bridge, near inlet to reservoir.

Sample No. 5, Hempstead Storage Reservoir at gate-house.

The results of the analyses of these samples are given below:

No.	Appearance. Turb	Sed.	Odor. Cold.	Nitrites.	Nitrates.	Chlorine.
1	Slight,	Heavy	Dis. musty	.0000	.0050	0.54
2	Opaque,	Heavy	Offen. tarry	.0360	.0050	5.29
3	Dis. mlk,	Heavy	F'tly. tarry and musty	.0060	.2250	1.18
4	None	Slight	F'tly. veg.	.0030	.2500	1.32
5	None	Slight	v. f'tly veg.	.0001	.0550	0.67

A glance at these figures shows at once the effect of the pollution of the brook by the tar liquor from the gas works and by the sewage from the houses and stables immediately below the latter. The large amount of nitrogen is very evidently derived from the drainage of the gas works. The tar liquor, which results as a by-product in the manufacture of gas, is collected in a brick well, from which a short over-flow pipe extends into the coal ashes in which the well is built.

The amount of liquor which is allowed to escape by this pipe is not very large, as it has a commercial value. Neverthe less a sufficient amount does escape to saturate the ashes immediately about the well and the rain washes this gradually out of the ashes into the brook, a distance of about twenty feet. The nitrogen which thus escapes, is largely in the form of ammonia compounds, as was very evident from a qualitative test of samples 2 and 3.

Nitrification soon commences after these compounds become dissolved in the brook water, and the very high nitrites obtained in samples 2, 3 and 4 together with the increase of nitrogen as nitrates, make this very evident.

The drainage from the gas works is by no means all the pollution the brook receives. A study of the chlorine shows that a large amount is probably derived from the works and by dilution disappears farther down the stream. The subsequent rise of the chlorine below the village as shown by sample No. 4 indicates the drainage from the village.

The result of the analysis of the sample taken at the opposite end of the storage reservior near the gate house has been given in order to show the effect of the dilution and purification which the water undergoes in its passage through the reservior.

Thirty-two microscopical examinations from January to September averaged 362 organisms per C. C. The highest count obtained was 953 organisms per C. C., in May, the lowest, 1 organism per C. C., in February. About 56 per cent. of the counts was below the average. Previous to June 19th the average count was 224 organisms per C. C. For the subsequent period the average count was 564 organisms per C. C. The average number of genera found was 11. Diatoms were found in 100 per cent. of the examinations, Algæ in 87 per cent., and Infusoria in 80 per cent.

The total number of individual genera was 57.

Melosira was found in 75 per cent. of the samples. No other genus occurred in 50 per cent. or over of the samples.

Hempstead Storage Reservoir presents great extremes in the number of organisms found at different times. The average is somewhat high and the total number of genera found includes a wide range of the more ordinary forms. Melosira was particularly constant, and sometimes abundant.

Organisms capable of producing disagreeable odors and tastes, such as Asterionella, Tabellaria, Anabaena, Dinobryon and Spongidae were found, some of them with frequency, but never in significant quantities. A high average count was obtained during the period of heavy rain-fall as compared with the average of the preceding period.

Thirty-three bacterial examinations from January to October averaged 630 organisms per C. C. The highest count obtained was 10,000 bacteria per C. C., in August, the lowest, 15 bacteria per C. C., in January.

About 80 per cent. of the counts were below the average.

Previous to June 19th the average count was 253 bacteria per C. C. For the subsequent period the average was 1,828 bacteria per C. C.

General species work was not carried on to an extent sufficient to justify final conclusions.

Twenty examinations for intestinal bacteria yielded but one positive result.

Eight microscopical examinations of the feeder at the inlet showed all the counts lower than the corresponding counts on the outlet ; six of these counts show the number of organisms to be less than 5 per cent. of the number of organisms in the corresponding outlet counts.

The genera found in addition to those already enumerated at the outlet are Achnanthes, Stauroneis, Spirogyra, Euglena and Synura.

Eight bacterial quantitative examinations show all the counts higher than the corresponding counts at the outlet. In five counts the number of bacteria at the outlet were less than 20 per cent. of the number of bacteria in corresponding counts at the inlet.

The general relation of the amount of rain-fall to the number of microscopical organisms at the inlet and to bacteria is evident.

The result of all three forms of analysis show a general relation to rain-fall, and hence to each other.

The nitrates, microscopical organisms and bacteria as found at the inlet and outlet of the Hempstead Storage Reservoir show the following relations: The nitrates and bacteria are much higher at inlet than at the outlet, the microscopical organisms are much higher at the outlet than at the inlet.

The general results of the chemical and bacterial work agree in showing the high degree of pollution of Horse Brook throughout its course and at the entrance to the Reservoir. They agree also in showing a decided dimunition in the chemical and bacterial constituents at the outlet of the Reservoir.

The odors of the water at the inlet are traceable directly to the condition of the feeder already described.

The odors at the outlet are vegetable in character. The microscopical organisms are not present at this latter point in sufficient quantity to account for these odors, which are probably traceable to vegetable matters in solution, derived from the feeder in the lower part of its course, and from the swampy area at the head of the Reservoir.

SCHODACK BROOK.

This brook runs in a southerly direction a short distance to the west of the Hempstead Storage Reservoir. It formerly was a feeder to Hempstead Pond, but is now utilized as a separate source of supply.

Its water is carried by a pipe line around the margin of Hempstead Pond, and enters the branch conduit just below the latter. The brook flows through a wooded and somewhat swampy country.

Inspection showed the presence of a pond which is used for an ice supply during the winter months upon the brook in the upper part of its course.

In the immediate vicinity of the pond are several dwellings with outbuildings and stables. The lower part of the feeder runs through a low swampy district, the ground rising on each side in a

somewhat abrupt slope. On this highland and its sloping sides a number of dwellings are situated with out-buildings, stables and pig-pens. The closets immediately along the brook are panned.

The brook is estimated to furnish about 1,000,000 gallons of water daily.

Twenty-eight chemical analyses have been made of the water from this brook. Its color during the summer months was low and the turbidity and sediment observed were very slight.

The odor, however, for the same period was persistently unpleasant, and sometimes disagreeable.

The free ammonia ranged between .0024 parts and .0114 parts, the higher results being obtained between May and October.

The albuminoid ammonia results lay between .0019 parts and .0316 parts, and are distributed as follows :

Percentage results	below .0100	[parts per 100,000]	= 67.8
" "	between .0100 and .0150	" " "	= 17.8
" "	" .0150 and .0300	" " "	= 14.2

Nitrites were found quite constantly during the summer months and were as high as .0007 parts. Nitrates for the same period are also somewhat high, the average for the results between July 20th and October 1st, being .0552 parts. The oxygen consumed was somewhat low and ran parallel with the color.

The determinations of the residue on evaporation show the water to have usually over 5.00 parts of total solids and over 3.50 parts of fixed solids. The hardness is about the same as that of the other waters of this section.

The average amount of chlorine as obtained from the twenty-eight determinations gave 0.64 parts.

The monthly averages were as follows :

1897.	Chlorine [parts per 100,000.]
February	.60
March	.64
April	.65
May	.64
June	.65
July	.64
August	.64
September	.63

Two determinations of iron gave .0100 parts and .0050 parts respectively.

Twenty-seven miscroscopical examinations from February to October average 14 organisms per C. C. The highest count obtained was 54 organisms per C. C., in August, the lowest, 3 organisms per C. C., in June. About 55 per cent. of the counts were below the average. Previous to June 19th the average count was 10 organisms per C. C.; for the subsequent period, 22 organisms per C. C. The average number of genera was 6.

Diatoms occurred in 100 per cent. of the samples. Algæ in 80 per cent. Infusoria in 63 per cent.

The total number of individual genera found was 29.

Tabellaria was present in about 75 per cent. of the samples, but only once in quantity of five or more. Navicula also was present in about 75 per cent. of the samples, occurring in quantities of five or more but twice. Eunotia occurred in 55 per cent. of the samples, only once in the quantity of five or more.

Schodack Brook does not present any unusual features.

The fluctuations in its microscopical contents are not quantitatively wide. The counts are low and the genera found not very numerous.

Organisms such as Asterionella, Tabellaria, Dinobryon and Synura capable of producing disagreeable odors and tastes in water were found, but never in significant numbers.

The higher average of the counts during the second period corresponds with the increased rain-fall.

Twenty-six bacterial quantitative examinations from Frebuary to October averaged 812 bacteria per C. C. The highest count obtained was 3,600 bacteria per C. C., in August, the lowest 200 bacteria per C. C., once in May, once in June, once in October. About 80 per cent. of the counts were below the average.

Previous to June 19th, the average count was 571 bacteria per C. C. For the subsequent period, the average was 1,400 bacteria per C. C.

General species work was not carried on to a sufficient extent for final conclusions.

Seven examinations for intestinal bacteria were made, all yielding negative results.

The correspondence between the bacterial counts and the rainfall is marked.

A general relationship of the results of all three forms of analyses to rain-fall exists.

The odors of the water are recorded as unpleasant and disagreeable. The microscopical organisms were not present in sufficient quantity to account for these odors, which are traceable rather to drainage of the surrounding swamp land.

HEMPSTEAD (DEMOTT'S) POND.

This pond is situated immediately south of Hempstead Storage Reservoir, which has a direct pipe line connection with it. It is connected by a branch conduit with the main couduit at the head of Smith's Pond. The narrow strip of ground between these two ponds is low and swampy. The water wasted from Hempstead Pond passes into Smith's Pond through the latter's eastern inlet.

The pond is estimated to furnish about 1,000,000 gallons of water daily. Inspection showed that the chief, if not the only, possibility of pollution to which this pond is exposed, consists of the arrangements made for the admission to it at will of the water from Hempstead Storage Reservoir. On the east bank of the pond an inhabited dwelling with outbuildings is found, and still further to the east, is a part of the village of Rockville Centre. These latter as sources of contamination are of comparatively little significance.

Thirty-three chemical examinations have been made of the water from this pond.

The average color of the water as determined during July, August and September was 0.20, which as compared with the color of the water from Hempstead Storage Reservoir for the same period was nearly three times as much.

This may perhaps be accounted for by the character of the drainage area immediately surrounding the pond from which it doubtless receives a large proportion of its water. It had a vegetable and

sometimes a marshy odor during the summer months, and showed very little turbidity or sediment.

The nitrogen as free ammonia varied between zero and .0062 parts, and steadily decreased from the middle of December, 1896, to the following May. It continued quite low with two exceptions until October.

The highest albuminoid ammonia result obtained was .0275 parts, in June, 1897, and the lowest, .0060 parts, in December, 1896.

The higher results were obtained during May, June, July, August and September. The distribution of the results according to the grouping previously used is as follows:

Percentage results below .0100	[parts per 100,000]	=40.6
" " between .0100 and .0150		=10.9
" " " .0150 and .0300		=48.5

Nitrites have never been found, and the nitrates determined between July and October were very low, ranging between zero and .0050 parts. The oxygen consumed results obtained during the same period follow the color quite closely.

The mineral constituents, as represented by the total solids and hardness, show it to be an average surface water, and to contain very little lime.

The chlorine determinations gave an average of 0.67 parts for the thirty-three examinations made.

The monthly averages, beginning in January of the present year, are as follows:

1897.	Chlorine [parts per 100,000].
January	.65
February	.72
March	.66
April	.65
June	.70
May	.70
July	.66
August	.65
September	.67

Two iron determinations gave .0100 and .0120 parts respectively.

Twenty-six miscroscopical examinations from February to October averaged 45 organisms per C. C. Omitting one exceptionally high count in March, this average becomes 24 organisms per C. C. The highest count obtained was 560 oganisms per C. C., in March the next highest was 67 organisms per C. C., in July, the lowest, 1 organism per C. C., in April.

About 80 per cent. of the counts were below the second average (24 organisms per C. C). Previous to June 19th, the average count was 49 organisms per C. C. Omitting the exceptional count in March, this average becomes 13 organisms. per C. C. For the subsequent period the count averaged 38 organisms per C. C., thus showing a relation to rain-fall.

The average number of genera was 6.

Diatoms were found in 90 per cent. of the samples, Algae in 63 per cent. and Infusoria in 90 per cent.

The total number of individual genera found was 40.

Navicula was found in about 58 per cent. of the samples, Tabellaria, Peridinium and Dinobryon in about 50 per cent. each.

Hempstead Pond does not present extraordinary miscroscopical features.

The miscroscopical contents resembles to some extent that of Hempstead Storage Reservoir, but is much less in quantity.

The counts obtained are not usually very high, the genera somewhat numerous.

Organisms sometimes associated with disagreeable odors and tastes such as Tabellaria, Dinobryon, and Spongidae have been found, but in quantities usually too small to have any effect.

Thirty-four bacterial quantitative examinations from January to October averaged 392 bacteria per C. C. The highest count obtained was 3,000 bacteria per C. C., in June, the lowest about 43 bacteria per C. C., in May.

About 68 per cent. of the counts were below the average.

Previous to June 19th, the average count was 371 bacteria per C. C.

For the subsequent period, the average was 490 bacteria per C. C.

Omitting the highest count 3,000 (bacteria per C. C., in June), the average previous to June 19th becomes 251 bacteria per C. C.,

emphasizing the effect of the heavy rains of the period subsequent to June 19th.

General species work has not been carried on to an extent justifying final conclusions.

Four examinations for intestinal bacteria were made, without positive result.

The bacterial quantitative results are fairly uniform and rather low previous to June 19th, with one or two single exceptions corresponding with heavy rain-fall. Subsequent to June 19th the counts are much higher, but still not excessive.

The result of the three forms of analysis show a general relationship to rain-fall, and hence to each other.

The vegetable odors predominate in this water, and cannot be accounted for by the number or character of its microscopical organisms, but are due rather to the vegetable matters in solution.

PINE'S POND AND FEEDER.

Pine's Pond lies a short distance west of Schodack Brook. It is fed by a stream, which rises about three or four miles to the north and includes in its course several small ponds.

A branch conduit, which has not been in use for some time, connects this pond with the main conduit at the head of Smith's Pond. The pond is provided with a gate-house and waste-water at its southern end, from which latter the water flows through Tanglewood Pond into Smith's Pond, forming its western feeder.

The drainage area from which this supply is drawn comprises 8.3 square miles, and includes some population on its southern portion. The pond has an area of eight acres, and furnishes about 600,000 gallons of water daily.

Twenty-three chemical examinations have been made of the water from the pond.

The color of the water was not very marked; at times considerable sediment has been observed, and the odor was usually vegetable in its character, often quite strongly so.

The free ammonia ranged from zero to .0062 parts, the latter result being obtained in July.

The albuminoid ammonia varied between .0061 parts and .0340 parts.

The results are distributed as follows:

Percentage	results	below	.0100	[parts per 100,000] 21.7
"	"	between	.0100 and .0150	= 39.1
"	"	"	.0150 and .0300	= 30.4
"	"	"	.0300 and .0400	= 8.8

Nitrites have been found in 43.4 per cent. of the results.

They were obtained in all the results between July and October, but never above .0005 parts.

Nitrates for the same period varied between .0320 parts and .0600 parts, averaging for the nine results .0431 parts.

The oxygen consumed results show the effect of the rains in July, and they diminish in amount in the months following.

The mineral constituents of the water are similar to those of the other waters of this section.

The average of the twenty-three chlorine determinations gave 0.66 parts, and the averages for the different months were as follows:

1897	Chlorine [parts per 100,000]
March	.62
April	.64
May	.70
June	.68
July	.62
August	.66
September	.64

Two determinations of iron gave .0070 and .0100 parts respectively.

Eight chemical examinations have been made of the water entering the pond. No very marked differences are evident from a comparison of these results with those obtained on the outlet of the pond, excepting in the case of the chlorine, which is higher at the inlet. The average of these eight analyses for chlorine gave 0.71 parts against 0.68 parts for samples from the outlet examined on the same dates.

Twenty-six microscopical examinations from January to September averaged 225 organisms per C. C. The highest count obtained was 1,468 organisms per C. C., in May. About 80 per cent. of the counts were below the average. Previous to June 19th, the average count was 370 organisms per C. C. For the subsequent period the average was 29 organisms per C. C. From February to May the pond was in process of cleaning; the water, consequently, was very low and held in suspension a great deal of the matter stirred up from the bottom of the pond. Unusually high counts were obtained in May.

The average number of genera found was 8.

Diatoms occurred in 96 per cent. of the samples, Algae and Infusoria in 80 per cent. each. The total number of genera found was 43. Navicula was found in 70 per cent. of the samples, Synedra in 77 per cent., Tabellaria in 70 per cent., Dinobryon in about 50 per cent.

Pine's Pond presents a series of high counts during the period previous to June, and following the cleaning of the pond; the samples being collected as the water passed from the overflow to the stream by which it reaches Smith's Pond.

Organisms capable of producing disagreeable odors and tastes in water at times, such as Asterionella, Tabellaria, Anabana, Dinobryon, Synura, Uvella and Uroglena were found at intervals, but usually in insignificant quantities.

Thirty-four bacterial examinations from January to October averaged 879 bacteria per C. C. The highest count obtained was 5,500 per C. C., in June, the lowest 90 bacteria per C. C., once in May and once in June.

About 76 per cent. of the counts were below the average.

Previous to June 19th the average was 939 bacteria per C. C. For the subsequent period the average was 725 bacteria per C. C.

General species work was not sufficiently detailed for extensive deductions. Seven examinations for intestinal bacteria yielded but one positive result.

Pine's Pond presents an unusual feature, in that the average count was lower during the period of heavy rain than before. This, however, is without doubt due to the fact that during the earlier period the pond was in process of cleaning.

The average of the counts is rather high for the whole period,

but the conditions already described prevent any very valuable deductions from them, either absolute or relative.

Eight microscopical examinations at the inlet show four counts lower than the corresponding counts on the outlet. These counts were all made in the period immediately subsequent to the cleaning of the pond, and the comparatively high counts obtained from the latter are thus explained.

The four subsequent counts obtained at the inlet are higher than those at the outlet. Both show a general tendency downward.

In addition to the forms already enumerated as found at the outlet the following also occurred: Achnanthes, Microcystis, Closterium and Daphnia.

Eight bacterial quantitative examinations at the inlet show uniformly higher counts than the corresponding counts at the outlet. The fluctuations in each series are fairly parallel, and show some relation to periods of heavy rain-fall.

A general relation of the results of the three forms of analysis to rain-fall exists. During the earlier part of the year, ending about the first of May, the pond was in process of cleaning. The effects of this cleaning have already been discussed in relation to the bacterial and microscopical results.

The vegetable and marshy odors recorded are traceable to vegetable matters in solution derived from the low land through which the feeder flows and at the head of the pond. The microscopical organisms were not present in sufficient quantity to account for them.

The nitrates and bacteria are uniformly higher at the inlet than the outlet, in the eight analyses made.

TANGLEWOOD POND AND FEEDER.

This pond lies directly south of Pine's Pond and receives its supply of water from the latter. It empties into Smith's Pond forming its western feeder.

It is a very small pond and has the same drainage area as that of Pine's Pond with the addition of the low land intervening between the two. No data concerning its area, capacity or daily yield, could be obtained.

Inspection showed the presence of a dwelling with out-buildings in close proximity to the pond. A duck pond on the premises drains directly into the feeder.

Twenty-five chemical examinations have been made of samples collected at the outlet of the pond, three from the centre, and ten at the inlet.

The color is practically the same as that found for the water from Pine's Pond. Little turbidity or sediment have been noticed, and the usual vegetable odor has been obtained in a large proportion of the samples.

The free ammonia, as determined on the centre and outlet samples, varied between zero and .0072 parts, 53 per cent. of which were .0010 parts or below.

The albuminoid ammonia on these samples ranged between .0040 parts and .0185 parts, and are distributed as follows :

Percentage results below .0100	[parts per 100,000]	=	60.6
" " between	.0100 and .0150	=	32.3
" " "	.0150 and .0300	=	7.1

Nitrites were found quite constantly between July and October but never over .0002 parts. The nitrates for the same period averaged .0394 parts, or a little lower than was obtained from the outlet at Pine's Pond.

The oxygen consumed results are similar to those obtained from Pine's Pond and run parallel with the color.

The total solids, fixed solids, and hardness are not materially different from those of the above-mentioned pond.

The average of the twenty-eight chlorine results on the outlet and centre samples gave 0.64 parts ; the monthly averages were as follows :

1897	Chlorine [parts 100,000]
February	.63
March	.68
April	.64
May	.70
June	.67
July	.59
August	.63
September	.61

The inlet gave results similar to those from the outlet and centre. The average of the chlorine results on the inlet and the outlet for the same period was .65 parts in each case.

Twenty-four microscopical examinations from February to September averaged 58 organisms per C. C. The highest count obtained was 398 organisms per C. C., in May, the lowest, 4 organisms per C. C., found once in April, and once in September ; 5 organisms per C. C. were found once in August, once in September. About 75 per cent. of the counts were below the average.

Previous to June 19th, the average count was 97 organisms per C. C. ; subsequently the average fell to 11 organisms per C. C.

The average number of genera was five.

Diatoms occurred in 100 per cent. of the samples, Infusoria in 63 per cent.

The total number of genera found was 33.

Synedra was found in 90 per cent. of the samples, Tabellaria in 63 per cent.

Tanglewood Pond presents no striking peculiarities in regard to microscopical contents. The relatively high counts of the period preceding June 19th corresponds with the cleaning of Pine's Pond.

Organisms capable of producing odors and tastes in water were found, such as Asterionella, Tabellaria, Dinobryon, Uvella, Uroglena and Spongidæ, but never in significant quantities.

Twenty-eight bacterial quantitative results from January to October average 1,133 bacteria per C. C. The highest count obtained was 11,000 bacteria per C. C., in August ; the lowest, 130 bacteria per C. C., in June. About 82 per cent. of the counts were below the average.

Previous to June 19th, the average was 838 bacteria per C. C. For the subsequent period the average was 1,913 bacteria per C. C.

General species work was not done in sufficient detail to justify conclusions.

Seven examinations for intestinal bacteria show one positive result in May. This is, however, but a small indication of the conditions usually present, on account of the fact that the pond supplying Tanglewood was in process of cleaning for a part of the period of observation,

Tanglewood Pond showed relatively high counts. The period

of heavy rain-fall showed also a decided corresponding increase in bacteria.

Eight microscopical examinations at the inlet of the feeder show three counts higher than the corresponding counts obtained at the outlet, four lower, one about the same.

The higher counts were obtained soon after cleaning of the pond supplying Tanglewood Pond.

The genera found in addition to those enumerated at the outlet were Closterium and Spirogyra.

Eight bacterial quantitative examinations at the inlet show three counts higher than the corresponding counts at the outlet, three counts lower, and two counts about the same. A general relation to rain-fall is evident.

There is a general relation between the results of the three forms of analysis and rain-fall, although a number of factors already decribed in the physical condition of this pond tend to make the relation less close than at certain other points.

There is no definite relation between nitrates bacteria and microscopical organisms at the inlet and outlet ; nor is there any relation between the odors found and the microscopical organisms, the former being probably traceable to vegetable matter in solution, derived from the aquatic vegetation of the pond itself and its feeder.

SMITH'S POND AND FEEDER.

Smith's Pond is situated on the western side of the village of Rockville Centre.

It lies immediately south of the conduit and north of the southern division of the L. I. R. R. track.

This pond acts as a reservoir for all the water of Pine's and Tanglewood Ponds and also for the surplus water of Hempstead Pond.

From the two former sources of supply the water enters Smith's Pond through its western feeder, and from the latter through its eastern feeder. The pond overflows through a waste weir into a creek which empties into the sea.

Excavations have been made in this pond to increase its capacity. Its estimated daily yield is 5,000,000 gallons.

The level of the pond is lower than that of the conduit which passes along its northern end, and in consequence the water is lifted by pumps into the conduit.

Inspection showed a dwelling situated on the western side of the pond; on the eastern side, but at an appreciable distance, is situated the village of Rockville Centre ; on the western side also at some distance from the pond, is the village of Lynbrook. A cemetery of some size is situated within 1,000 feet of the western side of the pond, standing on high ground from which there is a direct slope towards the pond.

Twenty-seven chemical analyses have been made of the water taken from the pump-well at the pumping station, situated on the northwestern side of the pond.

Six analyses of the water taken from samples collected from tap in the pumping station during March, April and May gave results similar to those from the pump-well. The results of these analyses have not been introduced into the following averages:

The color of the samples ranged between .10 and .25 during July, August and September. The sediment and turbidity have been very slight, and the odor, while at times mouldy and occasionally grassy, was as a rule simply vegetable.

The free ammonia ranged between zero and .0075 parts, the latter result being obtained in July following the heavy rains of that month. The albuminoid ammonia fluctuated between .0026 parts and .0221 parts. Over 83 per cent. of the results obtained after June 1st were above .0100 parts. The following table shows the distribution of the results according to the amounts obtained :

Percentage of results below .0100	[parts per 100,000]	=	55.5
" " between .0100 and .0150		=	29.6
" " " .0150 and .0300		=	14.8

The nitrites never exceeded .0001 part and were found only during the summer months.

The nitrates for this period ranged between .0170 parts and .0330 parts, averaging .0223 parts.

The results obtained from the determination of the total solids and hardness indicate the similarity of its mineral constituents to the other surface water of this section.

Two determinations of iron gave .0130 and .0300 parts respectively.

Thə averge of thc twenty-seven cholorine determinations gave 0.60 parts. The monthly averages were as follows :

1897	Chlorine [parts per 100,000]
January	.60
February	.56
March	.61
May	.65
June	.63
July	.58
August	.62
September	.62

One chlorine determination in December gave .55 parts and one in April gave .60 parts. An average of six chlorine determinations made on the samples collected from the tap in the pumping station gave .64 parts. This would make the average for the thirty-three determinations .62 parts instead of .60 parts. It is evident that some dilution of the water of this pond takes place by the drainage it receives from the territory immediately about it, and that the water thus entering the pond is less in chlorine than the water of the ponds which to a certain extent act as feeders to it.

The eight samples collected at the inlets for chemical analysis gave results similar to those obtained from the pond itself.

Twenty-eight microscopical examinations averaged 66 organisms per C. C.

The highest count obtained was 396 organisms per C. C., in May ; the lowest, 7 organisms per C. C., once in April, once in August ; 8 organisms per C. C. were found once in August, once in September. About 70 per cent. of the counts were below the average. Previous to June 19th the average was 93 organisms per C. C. Subsequently the average fell to 23 organisms per C. C.

The average number of genera was about 9.

Diatoms occurred in 100 per cent. of the samples, Infusoria in about 67 per cent. The total number of genera was 33.

Tabellaria was present in about 90 per cent. of the samples,

Navicula in 82 per cent., Synedra in 75 per cent., Dinobryon in 67 per cent. and Melosira in 64 per cent.

Smith's Pond presents nothing unusual microscopically. The high counts during the first period of observation corresponded with the cleaning of Pine's Pond which forms part of its supply.

Organisms capable of producing disagreeable odors and tastes, such as Asterionella, Tabellaria, Meridion, Ceathrocystis, Oscillaria, and Synedra were present, but never in excessive amount.

Thirty-four bacterial quantitative examinations from January to October, averaged 846 bacteria per C. C. The highest count obtained was 7,000 bacteria per C. C , in March; the lowest, 170 bacteria per C. C., once in May; 180 bacteria per C. C. were found once in May, once in June. About 70 per cent. of the counts were below the average.

Previous to June 19th, the average was 891 bacteria per C. C. For the subsequent period the average was 875 bacteria per C. C. Omitting the single high count of 7,000 bacteria per C. C., the average for the first period of observation becomes 636 bacteria per C. C., standing a little lower than that for the subsequent period.

General species work was not sufficiently detailed for final conclusions. Nine examinations for intestinal bacteria were made, all yielding negative results.

Smith's Pond presents no unusual bacterial features. The counts are relatively somewhat high. During the period of heavy rainfall, the average is less than during the preceding period. The higher average count of the earlier period corresponds with the cleaning of one of the ponds supplying Smith's Pond.

Four microscopical examinations of the eastern feeder at its inlet showed one count higher than the corresponding count at the outlet, two lower, one about the same.

The genera found in addition to those already enumerated at the outlet were Stauroneis, Closterium and Pediastrum.

Three bacterial quantitative examinations at the eastern inlet showed two counts about the same as the corresponding counts at the outlet, one lower.

Four microscopical examinations of the western feeder showed three counts lower than the corresponding counts at the outlet, one count about the same.

Three bacterial quantitative examinations of the western inlet showed two counts higher than the corresponding counts on the outlet, one lower.

The fact that the number of samples from each feeder were few in number and taken at different periods prevents any general conclusions from their comparison.

A general relation exists between the results of the three forms of analysis and the rain-fall. The odors do not correspond with the characters or numbers of the microscopical organisms found, and are traceable to vegetable matters in solution derived from the aquatic plants growing in considerable quantities in the pond and to the swamp soil through which the feeders run.

Nitrates, bacteria and microscopical organisms show no definite relations at the inlet as compared with the outlet.

VALLEY STREAM RESERVOIR AND FEEDER.

Valley Stream Reservoir lies over two miles and a half west of Smith's Pond and about 2,000 feet north of the main conduit, with which it is connected by a branch conduit.

The reservoir is fed by a stream which divides a short distance above it into two branches.

The western branch flows through a wooded and swampy country, sparsely populated, while the eastern branch includes several small ponds in its course and passes through a fairly well-settled section.

The drainage area comprises 6.3 square miles, and includes in its northern portion a part of the village of Hyde Park. This pond covers an area of about seventeen acres, and the estimated daily yield of the reservoir, together with a small pond (Watts) directly south of it, is 3,800,000 gallons.

This reservoir was in process of cleaning between December, 1896, and April, 1897.

Inspections showed the presence of one dwelling near the outlet of the reservoir. The western branch of the main feeder passes in the vicinity of two or three dwellings in its course. The eastern branch runs nearly parallel with and to the west of the Franklin Square Road. Situated in the intervening area, rarely more than three hundred feet in width, are a number of dwellings, with out-

buildings, stables and privy-vaults. The slope of the land tends to permit drainage directly toward the feeder. A still larger number of houses and outbuildings are situated on the east side of the Franklin Square Road, and the slope is also in general toward the feeder.

Twenty-six chemical analyses of samples of water collected at the gate house have been made since March 1st.

The color of the water during July, August and September decreased from .40 to .07. The turbidity and sediment were slight, and the odor vegetable, sometimes marshy.

The free ammonia on March 2nd, immediately following the cleaning of the reservoir, was .0055 parts; but after that date never rose above .0018 parts, while nearly 77 per cent. of the whole number of results were .0012 parts or under.

The albuminoid ammonia results ranged between .0071 parts and .0264 parts, and were distributed as follows:

Percentage results below	.0100 [parts per 100,000]	=46.1
" " between	.0100 and .0150.	=23.1
" " "	.0150 and .0300	=30.8

The higher results usually occurred during the summer months.

Nitrites were found in over 31 per cent. of the results, and were as high as .0014 parts on the 15th of September, but in all the other determinations were below .0006 parts. The average of the nine determinations of nitrates between July and October gave .0703 parts.

The total and fixed solids for the same period ranged between 5.60 parts and 6.90 parts for the former and 3.70 parts and 4.90 parts for the latter. The hardness averaged 1.6 parts for the same period.

The average of the twenty-six chlorine determinations was 0.65 parts. The monthly averages were as follows:

1897.	Chlorine [parts per 100,000].
March	.64
April	.66
May	.67
June	.65
July	.66
August	.64
September	.64

Nine chemical analyses of the water collected at the inlet to the reservoir were made between April and October. The results exhibit the same general features, characteristic of the results obtained on the pond, except that the nitrates were slightly higher in several instances and that the free and albuminoid ammonia figures were also somewhat higher.

Twenty-seven microscopical examinations, from January to September, averaged 22 organisms per C. C. The highest count obtained was 136 organisms per C. C., in January; the lowest, 1 organism per C. C., once in March, once in June. About 70 per cent. of the counts were lower than the average.

Omitting three counts obtained in January, February and March, during the process of cleaning the pond, the averages become, for the total period, 14 organisms per C. C.; for the period previous to June 19th, 17 organisms per C. C.; for the subsequent period 11 organisms per C. C. The average during the cleaning process was 85 organisms per C. C. Diatoms were found in about 93 per cent. and Infusoria in about 74 per cent. of the samples.

The average number of genera was five.

The total number of genera was 29. Synedra was found in about 50 per cent. of the samples.

Valley Stream Reservoir showed generally a low count; during the cleaning of the reservoir, which was finished in March, the average was considerably higher than at any other time.

Organisms capable of producing odors in water, such as Meridion, Tabellaria, Dinobryon and Uroglena were found, but not in significant quantities.

Thirty-one bacterial quantitative examinations, from January to October, averaged 1,441 bacteria per C. C. The highest count was about 8,000 bacteria per C. C., obtained in January; the lowest count was 64 bacteria per C. C., obtained in May. About 70 per cent. of the counts were below the average.

Previous to June 19th, the average was 1,513 bacteria per C. C. For the subsequent period the average was 1,325 bacteria per C. C. During the process of cleaning, the average of seven examinations (2.916 bacteria per C. C.) was considerably higher than the average for the period of heavy rain-fall. Omitting the samples collected at this time the average for the period preceding June 19th becomes

about 540 bacteria per C. C., which is considerably lower than the average for the subsequent period of heavy rain already given.

General species work was not carried out in sufficient detail to justify final conclusions.

Ten examinations for intestinal bacteria yielded one positive result. The process of cleaning in the earlier part of the first period of observation lessens the value of these results to some extent.

Eight microscopical examinations at the inlet of the feeder show four counts higher than the corresponding counts at the outlet; two counts lower, and two counts about the same.

The genera found in addition to those enumerated as occurring at the outlet were Asterionella, Cymbella, Epithemia, Surirella, Staurastrum, Euglena and Tintinnidium.

Seven bacterial quantitative results at the inlet gave six counts distinctly higher than the corresponding counts on the outlet and one count lower.

A general relation to rain-fall obtains.

A general relation exists between the results of the three forms of analysis and the rain-fall. During the process of cleaning the pond terminating in March, the microscopical and bacterial results are distinctly affected.

The odors cannot be traced to the microscopical organisms found, and are due to the swampy land through which the feeder and its branches run, and the aquatic vegetation there present.

Nitrates and bacteria were higher at the inlet than at the outlet as a rule in the eight analyses made. The microscopical organisms do not, however, show any constant relationship to the other determinations, although the tendency seems to be for the inlet counts to exceed the outlet counts.

WATT'S PUMPING STATION.

Watt's Pond, situated south of the main conduit, and about half a mile southwest of Valley Stream Reservoir, receives the overflow water from the latter.

The small stream which connects these two sources of supply receives additional water from a branch which enters it on the western side, a short distance above the point where the conduit

crosses the main feeder. This branch divides into two streams, the western being very short and the eastern extending a mile or two to the north and a short distance west of Valley Stream Reservoir.

The land drained by this small stream is more or less cultivated. The country which lies between Valley Stream Reservoir and Watt's Pond along the main feeder is low and swampy.

Inspection showed the presence of a few dwellings and outbuildings situated in the immediate neighborhood of the main feeder and others on the western branch of the same. In one case a pig-pen was found within twenty feet of the branch feeder.

Watt's Pond is provided with a waste weir at its southern end. On account of the fact that it lies lower than the main conduit, pumps are employed to lift the water from the pond to the conduit.

A system of driven wells, situated on the western side of the pond and connected with the same pumps is drawn upon for a portion of the supply. At times pond water alone had been pumped ; at times driven-well water alone, and at still other times mixtures of both, varying usually from one-fourth to one-third of pond water and the rest driven-well water.

The samples collected from the tap in the pumping station were therefore sometimes surface water only, sometimes ground water only and sometimes mixtures of both. The exact source of the water being pumped could not be ascertained for some of the samples collected. In most instances, however, general statements were obtained from those in charge of the pumping station, and these have been noted below the corresponding samples in the tables.

Valley Stream Reservoir which was being cleaned during the months of December, January and a part of February, was allowed to waste into Watt's Pond, which was during that period used as a source of supply.

Thirty-three samples in all were collected from the tap in the pumping station. Nine of these samples were pond water, six driven-well water, and eleven mixtures. The exact source of seven other samples could not be ascertained.

The unmixed pond water samples were all taken prior to the middle of April.

Of these, the five samples collected during the latter part of January and in February, showed high free ammonia varying between .0066 parts and .0082 parts.

The four samples collected between the middle of March and the mindle of April, also gave high free ammonia with one exception, which was probably due, as in the first instance, to the effect of the wasting of Valley Stream Reservoir water into Watt's Pond, during the cleaning of the former.

The albuminoid ammonia obtained from these nine samples ranged between .0058 parts and .0118 parts, and 77.7 per cent. of them were above .0090 parts.

The average of the nine chlorine determinations on these samples gave 0.65 parts.

The eleven mixed pond and well water samples were collected between the 20th of May and the 28th of September. The sample of May 27th contained but one-tenth pond water; the sample of May 20th contained one-fourth pond water; the other samples consisted of mixtures of one-third pond water and two-thirds well water. Omitting the sample first mentioned the remaining ten gave the following results:

The free ammonia ranged between .0012 parts and .0062 parts, and averaged .0037 parts.

The albuminoid ammonia results ranged between .0038 parts and .0278 parts; the latter result was obtained July 15th, and was probably due to the very heavy rains during that week. Omitting this high result the average becomes .0056 parts.

Seven of the samples gave .0001 part of nitrites, and one .0002 parts. Eight of the ten samples gave an average of .1033 parts of nitrates.*

The ten chlorine determinations gave an average of .75 parts or .10 parts higher than the nine pond water samples gave for the winter and spring months.

Seven of the samples examined for hardness gave an average of 2.0 parts.

The six driven-well water samples were scattered over six months' time, two samples being collected in March, one in April, two in May and one in August.

---

* Phenol Sulphonic Acid Method.

The free ammonia of these samples ranged between .0008 parts and .0036 parts, and averaged .0028 parts.

The albuminoid ammonia fluctuated between .0024 parts and .0070 parts, and gave an average of .0046 parts.

The chlorine results gave an average of 0.76 parts.

Three samples collected at the inlet to this pond have been analyzed.

Twenty-eight microscopical and twenty-five bacterial examinations were made from January to September.

From the samples, whose exact sources were identified, the following results were obtained :

Seven microscopical counts obtained from unmixed driven-well water gave an average of 3 organisms per C. C., the highest count being 4 organisms per C. C.; the lowest, 1 organism per C. C.

Seven bacterial counts showed an average of 53 bacteria per C. C. The highest count was 145 bacteria per C. C., the lowest, 5 bacteria per C. C.

Five microscopical counts from unmixed pond water averaged 21 organisms per C. C., the highest being 39 organisms per C. C., the lowest, 10 organisms per C. C. Eight bacterial counts averaged 3,305 bacteria per C. C., the highest count being 11,200 bacteria per C. C., the lowest, 440 bacteria per C. C.

Twelve microscopical counts from mixtures of one-third or one-fourth pond water to two-thirds or three-fourths driven-well water averaged 6 organisms per C. C., the highest being 34 organisms per C. C., the lowest showing no organisms.

The bacterial counts averaged 341 bacteria per C. C., the highest being 1,500 bacteria per C. C., the lowest, 30 bacteria per C. C.

The microscopical counts obtained when driven-well water alone was examined were low,and the samples usually contained numerous fungoid filaments. The bacterial counts also were low at such times. The pond water samples examined were somewhat higher in microscopical organisms, distinctly higher in bacterial counts, and showed few or no fungoid filaments. When the surface and ground waters were mixed, the results showed somewhat low microscopical counts, the fairly constant presence of fungoid filaments, and bacterial counts ranging between those obtained from

the ground water alone and those obtained from the surface water alone.

The counts on the unmixed pond water are relatively high during the period of observation, because at this time Valley Stream Reservoir, the pond supplying Watt's Pond, was in process of cleaning.

Counts from thirteen samples obtained at Watt's Pumping Station during this time averaged 2,910 bacteria per C. C.

The difference in the characters of the two classes of water pumped at different times from this station prevent close serial comparisons of the results of the three forms of analysis.

The free ammonia and the microscopical and bacterial counts showed corresponding increases during the cleaning of Valley Stream Reservoir. Changes from unmixed ground to unmixed surface water gave corresponding fluctuations in the chemical, bacterial and microscopical results.

The pumpage of mixtures of ground and surface waters gave results lying between the extremes obtained from the unmixed waters.

The odors obtained show no relation to the microscopical organisms, and are traceable to vegetable matter in solution.

CLEAR STREAM POND AND FEEDER.

Clear Stream Pond is situated nearly a mile west of Valley Stream Reservoir; it lies 2,000 feet north of the main conduit and is connected with it by a branch conduit.

The pond is a very small one, about an acre in extent, and is fed by two small streams, one entering on the northern side and the other on the western. The former stream, which is bounded by a narrow strip of low land, flows through a cultivated country.

The western branch is shorter, and two or three houses are situated near its banks. In one case a privy-vault stands within twenty feet of the feeder, the character of the ground permitting free drainage toward the feeder. The pond is estimated to furnish 800,000 gallons of water daily. The water flows by gravity into the conduit.

Thirty-three chemical examinations have been made of the water from the pond.

The color of the water was never above .20 during the time the color was estimated. The odor has been unpleasant and often disagreeable; at times it has been offensive.

The turbidity and sediment were not very marked, except in a few instances, when considerable was obtained.

The free ammonia ranged between .0003 parts and .0130 parts, with 57.7 per cent. of the results below .0050 parts, and the remainder above .0050 parts and below .0130 parts.

The albuminoid ammonia results lie between .0056 parts and .0235 parts, and are distributed as follows:

Percentage results below .0100	[parts per 100,000]	= 39.1
" " between .0100 and .0150		= 33.6
" " " 0150 and .0300		= 27.3

Nitrites were absent in only two of the thirty-three determinations made. The range for those samples in which nitrites were present, was between .0010 parts and .0044 parts, about 45 per cent. of the results being above .0020 parts.*

The nitrates were very high during the whole time. The average of the twenty-three results obtained previous to June 19th, was .3711 parts, and of nine results obtained, between July 15th and September 28th, the average was .2740 parts.*

The total solids ranged between 6.00 parts and 11.00 parts, with the majority of the results above 9.00 parts. * The fixed solids are correspondingly high, as is also the loss on ignition. The hardness, as determined by the soap method, average 2.2 parts for the nine determinations made. The average of the thirty-three chlorine determinations gave 0.79 parts. The averages by months were as follows:

1897.	Chlorine [parts per 100,000].
January	.87
February	.76
March	.76
April	.77
May	.82
June	.80
July	.82
August	.83
September	.80

* I. NOTE.—Results obtained for nitrates previous to June 19th were determined by the Copper-Zinc Couple Method, but after that date by the Phenol-Sulphonic Process.

The extremes in the chlorine results were 0.70 parts and 0.90 parts, and were obtained in February and June, respectively.

Twelve chemical examinations were made of the water from the two inlets to the pond, eight being made on the western feeder and four on the eastern.

The average of the eight determinations of chlorine on the western feeder gave 0.72 parts and the average of the four determinations on the eastern feeder gave 0.91 parts.

Twenty-seven microscopical examinations, from February to September, averaged 31 organisms per C. C. The highest count obtained was 374 organisms per C. C., in April. One sample, in August, showed no organisms. About 90 per cent. of the counts were below the average.

Previous to June 19th, the average was 37 organisms per C. C. For the subsequent period the average was 17 organisms per C. C. Omitting one exceptionally high count, 374 organisms per C. C., in April, the average previous to June 19th becomes 15 organisms per C. C., showing much closer relation between these two periods.

The average number of genera was 6.

Diatoms were present in 96 per cent. of the samples, Algæ in 80 per cent.

The total number of genera found was 33.

Navicula was found in 93 per cent. of the samples, Tabellaria in 55 per cent., Scenedesmus in 55 per cent.

Clear Stream pond shows nothing remarkable in its microscopical contents. The heavy rain-fall of the second period of observation does not affect the average count to any extent. Organisms capable of producing disagreeable odors and tastes in the water at times, such as Meridion, Tabellaria, Anabaena, Dinobryon and Synura, were found, but not in significant quantities.

Thirty bacterial quantitative examinations, from January to October, averaged 2,654 bacteria per C. C. The highest count obtained was 13,400 bacteria per C. C., in January, the lowest, 120 bacteria per C. C., in July. About 70 per cent. of the samples were below the average.

Previous to June 19th, the average count was 2,816 bacteria per C. C., after that date 2,353 bacteria per C. C.

General species work was not carried out on a sufficiently extensive scale to justify final conclusions.

Intestinal bacteria were obtained three times in seventeen examinations, twice in the pond, once in the western feeder.

Clear Stream Pond yields relatively high average counts. The fluctuations are not very wide or frequent. There seems to be little definite relation between the rain-fall and the count.

Eight microscopical examinations from the western feeder showed five counts higher than the corresponding counts obtained at the outlet, three counts lower.

The following genera were found in addition to those already enumerated as occurring at the outlet: Achnanthes, Stauroneis, Euglypha, Euglena, Glenodinium, Anurea.

Eight bacterial quantitative results showed six counts higher than the corresponding counts at the outlet, one lower, one about the same.

A general relation to rain-fall obtains.

Four microscopical examinations from the eastern feeder show all the counts higher than the corresponding counts on the outlet.

The following genera were found in addition to those already enumerated at the outlet: Cyclotella, Epithemia, Stauroneis.

Four bacterial quantitative examinations showed two counts higher than the corresponding counts at the outlet, two lower.

Compared with each other the western feeder was richer in microscopical organisms, and decidedly higher in bacterial contents, as a rule, during the period of parallel observation.

A general relationship exists between the results of the three forms of analysis and rain-fall. The odors recorded do not correspond with the microscopical organisms found.

Nitrates and bacteria were usually distinctly higher at the inlets than at the outlet. The microscopical organisms were also usually higher at the inlets.

TWIN PONDS (SIMONSON'S POND) AND FEEDER.

Twin Ponds is situated a little over a mile west of Clear Stream Pond, about 3,000 feet north of the conduit. It is connected with the latter by a branch conduit.

The Merrick Road divides the pond in two parts, which communicate with each other by a culvert under the road.

The southern portion has at its lower end a waste weir for the removal of the surplus water, and a gate house at the entrance to the branch conduit. The stream which feeds the pond enters at the upper end of the northern portion, and is about three miles in length.

The drainage area of this pond is 8.87 square miles. The area of the pond itself is 8.75 acres, and is estimated to furnish 2,000,000 gallons of water daily.

Inspection showed six dwellings in the vicinity of the pond, the slope of the ground permitting drainage to take place towards the pond.

The feeder runs parallel with, and to the west of, the Foster Meadow Road, rarely at a distance of more than three hundred feet.

On the intervening strip of land are situated twenty-one closets in close proximity to the feeder, at distances ranging between twenty and two hundred feet. On the date of the last inspection, in November, these closets were unpanned. Ten stables, four pigpens and eight chicken runs were found, all of which were within two hundred feet of the feeder, and many of them much nearer. There are four cemeteries close to the feeder on the eastern side of the Foster Meadow Road. Numerous dwellings and outbuildings, in addition to the above, are situated on the eastern side of this road also. The slope of the land is toward the feeder.

Thirty-four chemical examinations of samples of water collected at the gate house have been made.

The color was uniformly low, the highest reading having been 0.12. The turbidity and sediment have been very slight and the odor vegetable for the time during which determinations were made.

The free ammonia ranged between zero and .0160 parts, 47 per cent. of the results being above .0030 parts. The highest albuminoid ammonia result is .0274 parts, and the lowest .0028 parts. They are distributed according to the grouping previously adopted as follows :

Percentage results below	.0100	[parts per 100,000]	= 73.5
" " between	.0100 and .0150		= 20.6
" " "	.0150 and .0300		= 5.9

Nitrites were found in 76.4 per cent. of the results, and ranged between .0004 parts and .0128 parts; 54.6 per cent. of the positive nitrite results were above .0020 parts.

The nitrogen as nitrates was persistently high, and averaged .3073 parts, previous to June 16th, and .2521 parts after that date.

The total solids and hardness are rather high.

The average of the thirty-five chlorine determinations gave 0.81 parts. The monthly averages were as follows:

	Chlorine [parts per 100,000]
January	.85
February	.69
March	.77
April	.81
May	.82
June	.82
July	.90
August	.86
September	.85

Two iron determinations gave .0200 parts and .0050 parts, respectively, at different times.

The analyses of the samples collected at the inlet gave in general results similar to those obtained on the pond.

The odor of the water from the feeder was unpleasant at times, and considerable sediment has been noted.

Special analytical examinations of the feeder at various points in its course were made, yielding results confirmatory of the above.

Twenty-seven microscopical examinations from January to September averaged 29 organisms per C. C. The highest count obtained was 130 organisms per C. C., in August; the lowest, 3 organisms per C. C., once in March, once in August. About 70 per cent. of the counts were below the average.

1 NOTE.—Results obtained for nitrates previous to June 16th were determined by the Copper-Zinc Couple Method, but after that date the Phenol-Sulphonic Acid Process was used.

Previous to June 19th, the average was 20 organisms per C. C.; for the subsequent period the average was 46 organisms per C. C. Omitting from the latter period one exceptionally high count (130 organisms per C. C. in August) the average for the second period of observation becomes 31 organisms per C. C., still showing an increase over the average of the previous period.

Diatoms were found in 100 per cent. of the samples, and Algæ in 70 per cent.

The average number of genera was six.

The total number of individual genera found was 31.

Navicula was present in 77 per cent. of the samples, Synedra in 70 per cent.

Organisms capable of producing disagreeable odors and tastes in water were found, such as Meridion, Tabellaria, Anabæna, Pandorina and Dinobryon, but never in significant quantities.

A brown floating scum, consisting largely of Oscillaria filaments, together with numerous Diatoms, Infusoria and other minute animal and vegetable life, was found frequently on the surface of this pond towards the upper end, sometimes in considerable quantity.

Thirty-one bacterial quantitative examinations, from January to October, average 5,979 bacteria per C. C The highest count obtained was 48,700 bacteria per C. C., in January; the lowest 300 bacteria per C. C., in September.

About 84 per cent. of the samples were below the average.

Previous to June 19th, the average was 7,791 bacteria per C. C. Omitting four very high counts, the average for this period becomes 2,105 bacteria per C. C. For the subsequent period the count averaged 1,619 bacteria per C. C.

General species work was not carried on in sufficient detail to warrant final conclusions.

Sixteen examinations for intestinal bacteria yielded positive results five times, once each in January, February, March, May and June.

Twin Ponds yielded relatively high individual bacterial counts, and also a relatively high average. The fluctuations are wide and numerous, suggesting a constantly varying condition of the water.

Eight microscopical examinations at the inlet of the feeder show

six counts higher than the corresponding counts at the outlet, one count lower, one about the same period.

The genera found in addition to those occurring at the outlet were Gomphonema, Stauroneis, Clathrocystis, Pediastrum, Anguillula.

Eight bacterial quantitative examinations at the inlet gave three counts higher than the corresponding counts at the outlet, three counts lower and two about the same. A general relation of counts to rain-fall may be seen.

A general relationship between the results of the three forms of analysis and the rain-fall exists.

The odors found are not explained by the number or character of the organisms present, but are traceable to the marshy soil through which the feeder flows and the character of the drainage it receives.

SPRINGFIELD POND AND FEEDER.

This pond known as the Lower Springfield Pond, in distinction to the pond just north of it, called the Upper Springfield Pond, lies about three-quarters of a mile west of Twin Ponds and less than a thousand feet south of the main conduit. It is fed by a small stream which rises about two miles to the north and includes in its course, Upper Springfield Pond also known as Durland's or Nostrand's Pond. A branch which joins the feeder between the Upper and Lower Springfield Ponds is somewhat over a mile in length and includes in its course a small pond called Gross' Pond.

The course of the main feeder is close to the Springfield Road and dwellings and out-buildings constituting a part of the village of Springfield intervene between the street and the stream for more than half its length. Dwellings and out-buildings are also to be found on the opposite side of the road in considerable numbers. The whole section is thickly settled and the natural drainage is directly into the stream.

The closets immediately along the feeder are panned, but the drainage of stables, pig-pens and fowl runs, which are situated close to the banks, have full access to it. These conditions have been made the subject of a special report to the State Board of Health,

since which time this source of supply has been placed out of service.

The ground is low about the feeder and the pond, and considerable rank vegetation is to be found during the summer months in and along the edges of the Upper Springfield Pond, and also about Gross Pond on the branch feeder.

The banks of the Lower Springfield Pond are very flat and low with more or less vegetation. The pond is provided with a waste weir at the lower end.

The pond is estimated to furnish 1,500,000 gallons of water daily.

The drainage area of the pond and feeder is 8.12 square miles, and consists largely of cultivated land in the northern portion, including the village of Floral Park.

A pumping station at the northern end of the pond lifts the water into the main conduit.

Previous to May, sixteen samples were collected for chemical analysis at the pumping station. Between July 21st and October 1st, nine samples were collected from the overflow at the southern end of the pond.

The sixteen samples from the pumping station are discussed together, as are also those from the overflow.

The free ammonia results obtained previous to May 1st ranged between .0008 parts and .0118 parts, 50 per cent. of them being above .0050 parts.

The albuminoid ammonia results varied between .0042 parts and .0234 parts, and are distributed as follows:

Percentage results	below	.0100	[parts per 100,000]	= 62.5
'	"	between .0100 and .0150		= 18.7
"	"	" .0150 and .0300		= 18.8

The average of the results below .0100 parts gave .0074 parts.

Nitrites were found in 50 per cent. of the results and ranged between .0002 parts and .0012 parts.

The nitrates were quite uniform and relatively high.

The total solids are somewhat high and the fixed solids and hardness are in proportion.

The average of the sixteen chlorine determinations gave 0.95 parts, and the averages by months were as follows :

1897	Chlorine [parts per 100,000].
January	.92
February	.98
March	.96
April	.91

The nine samples collected from the overflow between July 21st and October 1st, may be summarized as follows :

The color of the water has been rather high, ranging between 0.80 and 0.15. It decreased gradually after the heavy rain-fall in July, the oxygen consumed decreasing with it.

The water showed very little turbidity, but considerable sediment. The odors were vegetable, disagreeable, fishy and aromatic.

The free ammonia ranged between .0006 and .0386 parts. The three results of July 21st, 29th and August 4th gave .0198, .0386 and .0152 parts respectively, and seem to be due to the heavy rain-fall of that period, as both the color and the albuminoid ammonia were high in the same analyses.

The albuminoid ammonia ranged between .0122 parts and .0354 parts, and the results are distributed as follows :

Percentage results below .0100	[parts per 100,000]	= 11.1
" " between .0150 and .0300		= 66.6
" " " .0300 and .0400		= 22.2

Nitrites were present in all the determinations made. The highest result obtained was .0040 parts and the lowest, .0007 parts. The average of all the analyses was .0019 parts.

The* nitrates were somewhat high and averaged .0893 parts. The total and fixed solids varied between 11.30 and 8.80 parts, and 5.90 and 8.70 parts, respectively.

The hardness averaged 3.1 parts.

The results of the chlorine determinations averaged 1.11 parts. The average by months were as follows :

1897	Chlorine [parts per 100,000].
July	1.15
August	1.11
September	1.10

*Phenol Sulphonic Acid Method.

The feeders to this pond were examined chemically several times. Six special analyses were made in March. They confirm the results of the analyses made of the water from the pond and from the inlet to the pond.

Three samples in August and one in September, collected at the inlet to Lower Springfield Pond, gave results quite similar to the results obtained on parallel samples collected at the overflow on same dates.

Twelve microscopical examinations of the water at the pumping station, from January to April, averaged 46 organisms per C. C.; the highest count was 190 organisms per C. C., in January; the lowest, 2 organisms per C. C., in April. About 75 per cent. of the counts were below the average.

Omitting the highest figure obtained, as given above, the average became 33 organisms per C. C.

Diatoms were found in 100 per cent. of the samples, Algæ and Infusoria in about 75 per cent.

The average number of genera was 8.

The total number of individual genera found was 35.

Navicula and Tabellaria were present in 75 per cent. of the samples, Synedra in 80 per cent., Eunotia in 50 per cent.

It was considered advisable to continue examinations of Springfield Pond after it was cut out of the supply in April. The samples were then taken from the overflow, at the lower end of the pond, beginning in July.

Nine microscopical examinations, from July to September, averaged 717 organisms per C. C. The highest count obtained was 1828 organisms, in August; the lowest, 151 organisms per C. C., in September. About 66 per cent. of the counts were below the average.

Diatoms, Algæ and Infusoria were found in 100 per cent. of the samples.

The total number of individual genera found was 36.

Melosira and Synedra were found in 100 per cent. of the samples; Navicula in about 90 per cent., Nitzchia and Tabellaria in about 80 per cent., Dinobryon and Euglena in about 66 per cent., Monas in about 90 per cent.

Springfield Pond, as examined at its pumping station, did not

show anything unusual for the period of observation terminating in April. The counts were usually low, and the organisms capable of producing disagreeable odors and tastes were not strongly in evidence.

The microscopical examinations made at the overflow during the period of heavy rain-fall, the pond being out of service, showed a much higher average count. The genera were numerous, and many forms were present in high numbers.

Of the organisms associated with disagreeable odors and tastes in water, Dinobryon was prominent during August and the first week in September, reaching its maximum count in the third week of August.

During the period from January to April, the bacterial quantitative examinations were made on water from the pumping station.

Fifteen such examinations yielded an average for this period of 3,820 bacteria per C.C. The highest coount was 14,200 bacteria per C. C., in March, the lowest, 265 bacteria per C. C., in April. Sixty-six per cent. of the counts were below the average.

For the period from July to September, the samples were taken from the overflow at the lower end of the pond.

Nine examinations show an average of 1,311 bacteria per C. C. The highest count obtained was 5,000 bacteria per C. C., in August, the lowest, 200 bacteria per C. C., in September.

About 77 per cent. of the counts were below the average.

General species work was not sufficiently detailed to justify final conclusions.

Seventeen examinations for intestinal bacteria resulted in but one positive reaction.

The results obtained from Springfield Pond at the pumping station are not directly comparable with those obtained at the overflow, the former being situated at the upper end of the pond, near the entrance of the feeder, the latter at the lower end of the pond.

Again the wide differences in the meteorological conditions existent at the two periods, further prevent any close comparisons. It is noteworthy that the average from the pumping station is much higher than that from the overflow, in spite of the heavy rain-fall of the period during which the latter was examined.

Four microscopical examinations were made in August and September from the feeder at the inlet to the pond.

The four microscopical counts were in every case much lower than the corresponding counts at the overflow.

The following genera were found in addition to those already enumerated as occurring at the overflow : Asterionella,Glenodinium and Trachelomonas.

Of the four bacterial quantitative examinations three counts were decidedly higher than the corresponding counts at the overflow, one lower.

The analyses made of water from Springfield Pond are somewhat limited in number, and the locality at which the water was collected varied in the two series of examinations. Nevertheless, a general relationship obtained between the three forms of analysis and the rain-fall.

The odors obtained at Springfield have not borns direct relation to the microscopical organisms found,except during the period from August 11th to the 25th.

A table showing the comparison of these results with the odors is here submitted.

Date.		Odors.	Dinobryon.
July	21st	Dist. veg. and disagreeable	
"	29th	Dist. vegetable	
Aug.	4th	Dist. veg. and aromatic,	12
"	11th	Dist. veg and fishy,	223
"	18th	Dist. fishy,	880
Aug.	25th	Dist. veg. and fishy,	372
Aug.	31st	Faintly veg.	124
Sept.	15th	Faintly veg.	
"	28th	Faintly veg. and unpleasant	

It will be seen that Dinobryon appears previous to the presence of the fishy odor and persists beyond its disappearance.

The lowest count obtained corresponding with a fishy odor was 223. It is to be noted that this odor was at no time detectable without heating the water. The total number of genera found in this source of supply for the whole period was 57.

Nitrates and bacteria were usually higher at the inlet than at the outlet for the four determinations made, microscopical organisms showing the inverse relation.

BAISELEY'S (JAMAICA) POND AND FEEDER.

This pond lies about one and three-quarter miles west of Springfield in the town of Jamaica. It has an area of forty acres, and is connected by a branch conduit with the main conduit, which lies about 3,000 feet south of it. It is 5.4 miles distant from the Ridgewood Pumping Station, as measured along the conduit.

The pond is fed by a stream which enters at the northern end, and which is formed by the junction of two branches a short distance above the pond. One branch comes from the northeast and the other from the northwest, the latter rising near the village of Jamaica. A small stream also flows into the pond on its southeastern side. The pond overflows at its southern end into Beaver Creek, which empties into the sea.

The drainage area is 10.88 square miles, and includes the village of Jamaica and one or two other smaller places.

Very evident opportunities for the pollution of the pond exist.

This source of supply has been out of service for two years or more, and it is not considered necessary to give detailed records of its sanitary condition.

Thirty-three chemical examinations were made of the water collected at the waste weir.

The color during July, August and September ranged between .80 and .17, and fluctuated considerably during the whole period. The pond showed considerable turbidity and sediment during the summer months. This was due to the vegetable organisms which infested the pond during the greater part of the period of observation.

The odor during July, August and September was decidedly vegetable and grassy.

The free ammonia ranged between zero and .0118 parts, and of the thirteen results between .0030 parts and .0118 parts, 69.2 per cent. were obtained previous to the middle of March. With one or two exceptions it may be said that the free ammonia decreased as the albuminoid ammonia increased. The total albuminoid ammonia

increased enormously as the growth of the organisms increased, and very high figures for this determination were obtained.

The albuminoid ammonia results may be grouped as follows :

Percentage results below .0100	[parts per 100,000]	= 6.0
" " between .0100 and .0150		= 24 2
" " " .0150 and .0300		= 9.0
" " " .0300 and .0500		= 15.1
" " " .0500 and .1200		= 45.4

All the results above .0500 parts were obtained after the 20th of May. The highest result, .1168 parts, was obtained on the 28th of September. The dissolved albuminoid ammonia determined in August and September was, with one exception, between .0200 parts and .0250 parts, while the suspended albuminoid ammonia during the same period varied between .0500 parts and .0916 parts, thus further showing the excessive amount of suspended matter present.

Nitrites were found twice in July, once in August and twice in September. The amounts were never above .0007 parts.

The nitrates during the months just mentioned fluctuated between zero and .0270 parts, and were very variable.

The oxygen consumed figures varied between 0.26 parts and 0.56 parts, and did not follow the color very closely. These results were obtained on the filtered samples. Determinations made on the unfiltered samples gave very high results on account of the organisms present. Two examples will suffice to show the reducing action of the suspended organisms on the potassinum permanganate employed in the determination.

Oxygen Consumed [parts per 100,000.]

	Unfiltered.	Filtered
Aug. 4th, Baiseley's Overflow	1.07	.56
" 19th, " "	1.56	.27

The total solids determined have been uniformly high, averaging about ten or twelve parts. The loss on ignition and the fixed solids have also been proportionately high. The hardness results averaged for the fifteen determinations made, 4.3 parts.

Thirty-three chlorine determinations gave an average of 0.98 parts.

The averages by months were as follows:

1897.	Chlorine [parts per 100,000.]
January	1.02
February	.91
March	.96
April	.96
May	1.00
June	.97
July	.94
August	1.03
September	1.08

Eight chemical examinations of the water collected at the northern inlet have been made.

The nitrates at the inlet were very high as compared with those obtained at the outlet. The inverse relation holds in the case of the albuminoid ammonia.

Twenty-eight microscopical examinations, from February to September, averaged 3,173 organisms per C. C. The highest count obtained was 16,130 organisms per C. C., in August; the lowest, 46 organisms per C. C., in February. About 60 per cent. of the counts were below the average.

Previous to June 19th, the average was 2,449 organisms per C. C.; for the subsequent period 4,384 organisms per C. C. The average number of genera was 10.

Omitting the exceptionally high count of 16,130 organisms per C. C. in August, the average for the second period of observation becomes 3,077 organisms per C. C., which is still decidedly greater than for the preceding period. From the end of April to the middle of June the average was 4,424 organisms per C. C. As compared with this average, the period of heavy rain-fall shows a decidedly smaller number of organisms.

Diatoms were found in about 92 per cent. of the samples, Cyanophyceæ in 75 per cent., Algæ in 90 per cent., Infusoria in about 57 per cent. The average number of genera was 10. The total number of genera found was 43.

Asterionella was present in about 50 per cent. of the samples, Melosira in 79 per cent., Navicula in 53 per cent., Synedra in 79 per cent., Clathrocystis in about 71 per cent., Oscillaria in 53 per

cent., Pediastrum in 71 per cent., Scenedesmus in 82 per cent., Staurastrum in 60 per cent.

Baiseley's Pond presents unusually high counts, wide fluctuations, high averages, large quantities of certain forms, and a large number of individual genera. The principal organism in point of frequency was Melosira; the most prominent as affecting the appearance and odor of the water was Clathrocystis, a blue-green Alga which was very abundant from the end of March onward, often in such numbers that the surface of the pond presented a green appearance.

The designation Oscillaria has not been restricted to the ordinary blue-green filaments characteristic of this genus, but has been made to include also a form, the exact biological relations of which were not completely determined, but which nevertheless is evidently allied to the members of this genus.

In the earlier part of the year, one such Oscillariatoid organism was found presenting most of the features of a variety of Sphærozyga.

Of organisms capable of producing disagreeable odors and tastes in water, the following were found, usually in quantities insufficient to give rise to their characteristic odors:

Asterionella, Meridion, Tabellaria, Anabæna, Pandorina and Dinobryon. The effect of the presence of Clathrocystis is described further on.

Thirty-two bacterial quantitative examinations, from January to October, averaged 1,841 bacteria per C. C. The highest count obtained was 17,000 bacteria per C. C., in January; the lowest, 45 bacteria per C. C., in June. About 80 per cent. of the counts were below the average.

Previous to June 19th, the average count was 2,365 bacteria per C. C.; for the subsequent period, the average was 492 bacteria per C. C. General species work was not carried on to an extent justifying any final conclusion.

Ten examinations for intestinal bacteria yielded two positive results.

Eight microscopical examinations of the main feeder at the inlet to the pond show all the counts very much lower than the corresponding counts at the outlet. The genera found in addition to

those already enumerated as occurring at the outlet, were Amphora, Cyclotella, Closterium, Cryptomonas and Trachelomonas.

Eight bacterial quantitative examinations at the inlet show all the counts but one very much higher than the corresponding counts at the outlet.

A general relationship between the three forms of analysis and the rain-fall exists.

The odors recorded were traced to the microscopical organisms present, one form Clathrocystis, being especially responsible for the grassy odor.

A table is appended, giving this relation in detail :

	Odor.		Microscopical Organisms.	
Date.	Cold.	Hot.	Total Organisms.	Clathrocystis.
July 15th,	Veg. and grassy.	Veg., grassy and aromatic...	915	653
July 21st,	Veg. and grassy.	Veg. and grassy .	2,156	772
July 29th,	Veg. and grassy.	Veg. and grassy .	4,520	1,400
Aug. 4th,	Veg.	Veg. and grassy .	4,450	590
Aug. 12th,	Veg. and grassy.	Veg. and grassy .	2,700	650
Aug. 19th,	Veg. and grassy.	Veg. and grassy .	2,640	600
Aug. 26th,	Veg. and grassy.	Veg. and grassy .	16,130	600
Aug. 31st,	Veg. and grassy.	Veg. and grassy .	6,600	300
Sept. 16th,	Veg. and grassy and aromatic.	Veg. and grassy .	2,780	1,000
Sept. 28th,	Veg. and grassy.	Veg. and grassy .	3,380	1,300

Nitrates and bacteria were uniformly higher at the inlet than at the outlet, the microscopical organisms and albuminoid ammonia uniformly presenting the inverse relation.

RIDGEWOOD RESERVOIR AND PUMPING STATION.

The Ridgewood Reservoir is situated on the crest of a hill in East New York, part of the ridge of hills forming the backbone of Long Island.

The Reservoir receives all the water of the water shed of Long Island connected with the city supply, from Massapequa Pond to the Spring Creek Driven-Well Plant in East New York. It is about one hundred and seventy feet above the tide level, and is

used as a distributing reservoir for the city. A large brick conduit with its several branches and extensions, together with a forty-eight-inch main from the Pumping Station at Millburn, brings the water of the shed to the Ridgewood Pumping Station. From this point the water is lifted by the pumps to the reservoir. From the reservoir the water descends by gravitation through large distributing mains to the various sections of the city.

The Ridgewood Pumping Station is situated at the foot of the Ridgewood Hills, near the corner of Atlantic Avenue and Norwood Street, in East New York.

It consists of two separate plants, the Old Plant situated on the northern side of Atlantic Avenue and the New Plant directly south of the Old Plant, on the opposite side of Atlantic Avenue. The L. I. R. R. passes between the two.

Provision is made, it is stated, for the admission to either plant of the water brought to this point by both conduit and force main. A full description of these plants could not be obtained.

The reservoir consists of three basins, No. 1, No. 2 and No. 3, in order from east to west.

Nos. 1 and 2 have areas of 11.85 acres and 13.73 acres respectively, giving a total of 25.58 acres and a capacity of 161,221,385 gallons.

These basins together form the old reservoir. They lie side by side, and have a common influx chamber, situated between the southwestern angle of No. 1 and the southeastern angle of No 2, connecting with both. Force mains from the old and new plants of the Ridgewood Pumping Station empty into this chamber, the water escaping thence into both basins.

Basin No. 3 was completed in 1891, forming the new reservoir. It lies on the western side of basin No. 2, and has a capacity of 160,000,000 gallons, being therefore approximately equal in capacity to both the old basins together. The influx chamber is situated at the southeastern angle; force mains enter it from the new plant of the Ridgewood Pumping Station.

Basins No. 1 and No. 2 are therefore fed from the same pipes; Basin No. 3 from a separate supply. Nevertheless, it is understood that the connection between the old and the new plants is such that no uniform division of the different classes of water from the water

shed is there made, and therefore no general and constant differences are presented by the waters reaching the respective influx chambers. Moreover, a siphon connection exists between Basins 2 and 3, so that the waters of the two basins may interchange as the levels in each vary.

The distributing trunk mains, five in number, receive the water from these basins at efflux chambers, situated at the northern ends of the basins, opposite the influx chambers.

The exact section of the city supplied by these different mains can only be given approximately ; the second and fourth trunk mains are stated to lead into the heart of the city, and the third trunk main into the northeastern section. Further than this no definite information could be obtained ; nevertheless, the connections of the smaller mains in the city with each other are so intimate that the engineering data on this subject does not elucidate definitely the question of the final admixture of the waters as they reach the taps.

Inasmuch as these facts were recognized in beginning the work of the Laboratory, and have since been confirmed by investigations carried on to determine the relation existing between the water drawn from certain of the city taps and the reservoirs without satisfactory result, few city tap samples have been examined, and the examinations made have been limited to the determination of the microscopical organisms found, and the color, odor, turbidity and sediment.

These results are tabulated below those obtained at Ridgewood.

The total capacity of the three basins is about 320,000,000 gallons. Allowing an average daily supply to the city of about 80,000,000 gallons, it will be seen that the reservoir holds approximately four days' supply. It would appear that the water entering the inlets to the reservoir on any given day reaches the outlets about four days later. However, this cannot be regarded as absolute.

The water entering on any given day does not flow in a direct stream to the outlet, but becomes more or less mixed with the water already present in the reservoir when it first enters, and with the water which follows it.

It is therefore not by any means to be expected that close relations

would exist between the characters of the water at the inlet and those of the water at the outlet on the same day.

The characters of each of the waters of the different surface and ground supplies vary from day to day, and the proportion of the waters coming from each also vary from day to day.

Different lengths of time are consumed by each water in reaching the reservoir, and the general result is an admixture, the physical characters and exact sources of which for any given day could not be deduced from the available engineering data by any method of calculation.

Since this is the case, it has been impossible to do more than determine that the analytical characters of the reservoir water agree in a general way with those of the water of the shed.

RIDGEWOOD RESERVOIR; OUTLET TO BASIN NO. 1 (EASTERN).

Sixteeen samples, collected at the outlet of this basin, were examined chemically between May and October.

The color of the water ranged between .27 and .07, with a general tendency downward, from the middle of July to the first of October.

The turbidity was very slight and the sediment slight, excepting in the latter part of August and through September.

The odor was vegetable for most of the time. An aromatic odor was obtained on the 27th of September.

The free ammonia was uniformly low, with one or two exceptions. The albuminoid ammonia ranged between .0060 parts and .0212 parts, and the results may be grouped as follows:

Percentage results below	.0100	[parts per 100,000]	=12.5
" " between	.0100 and .0150		=56.2
" " "	.0150 and .0300		=31.3

Nitrites were found eight times during July, August and September, but never above .0005 parts.

Nitrates, following the middle of July, ranged between .0450 parts and .0830 parts. and averaged .0603 parts.

The oxygen consumed in the main followed the color in its variations.

The total solids are about 12.00 parts and the fixed solids about 9.00 parts. The hardness averaged 4.4 parts for nine determinations, made between July and October.

The chlorine results give 2.19 parts as an average of sixteen determinations, and the monthly averages were as follows :

1897.	Chlorine [parts per 100,000]
May	1.82
June	2.05
July	2.25
August	2.34
September	2.57

The microscopical results group themselves naturally as follows:

Nine microscopical examinations in April, May and June, averaged 3,733 organisms per C. C., in June. The highest count obtained was 7,584 organisms per C. C., the lowest count, 698 organisms per C. C., in May.

Six examinations during the period of heavy rain-fall, from July 17th to August 21st averaged 247 organisms per C. C. The rain-fall for these six weeks averaged two inches per week. The total rainfall for the six weeks was a little less than one-third of the average yearly rain-fall for this section of the country.

There was more or less steady diminution in the rain-fall, however, from July 17th to August 21st, while at the same time the microscopical organisms increased, reaching a count of 2,528 in the week ending August 28th. During this week over two inches of rain fell. A diminution in the count followed in the subsequent week, rising again to 5,532 organisms on September 18th.

Diatoms were present in 100 per cent. of the samples, Cyanophyceæ in 57 per cent., Algæ in 89 per cent. and Infusoria in 89 per cent.

The total number of genera found was 38.

Asterionella was found in 100 per cent. of the samples, Melosira in 79 per cent., Synedra in 79 per cent., Dinobryon in 57 per cent. and Monas in 52 per cent.

Of the organisms capable of producing unpleasant odors and

tastes in water, the following were found: Asterionella, Meridion, Tabellaria, Anabæna, Clathrocystis, Eudorina, Volvox and Uroglena.

Of these, only Asteroinella was found in sufficient quantity to be of significance.

It is noteworthy that in each case where a considerable precipitation of rain occurred in any one week, a corresponding diminution in organisms was evident in the following week at the reservoir.

Seventeen bacterial quantitative analyses at the outlet showed a general relation to rain-fall, and the fluctuations corresponded more or less closely, but in inverse ratio, to the microscopical counts.

RIDGEWOOD RESERVOIR; OUTLET TO BASIN NO. 2 (CENTRAL).

There were sixteen samples collected, at the outlet of this reservoir, for chemical analysis.

The color ranged between .37 and .06, gradually diminishing from July to October. The turbidity was very slight and the sediment slight for the whole time during which determinations were made.

The odor was vegetable and never very decided.

The free ammonia ranged between zero and .0040 parts, and the albuminoid ammonia between .0035 parts and .0254 parts. The albuminoid ammonia results may be grouped as follows:

Percentage results below .0100 [parts per 100,000]	=50.0
" " between .0100 and .0150	=43.8
" " " .0150 and .0300	= 6.2

Nitrites were found seven times in the nine determinations, made between July 14th and October 1st, but never rose above .0002 parts. Nitrates for the same period ranged between 0.430 parts and .0800 parts, and averaged .0653 parts. The oxygen consumed figures followed the color variations quite well.

The total solids are between eleven and twelve parts, and the fixed solids about eight parts. The average of the nine hardness determinations was very nearly 4.0 parts.

The chlorine results gave an average for the sixteen determinations of 1.93 parts, and the monthly averages were as follows :

1897	Chlorine [parts per 100,000]
May	1.56
June	1.77
July	1.94
August	2.14
September	2.32

Eight microscopical examinations at the outlet of Basin No. 2, in May and June, showed a fairly steady increase from 54 organisms per C. C., on May 1st, to 4,740 organisms on June 19th. Ten subsequent examinations, from July 17th to October 2d, covering the period of heavy rain-fall, showed a remarkable diminution, ending with a slight rise, corresponding roughly with the variations in the rainfall.

The total number of individual genera found was 34.

Diatoms were found in 100 per cent. of the samples, Cyanophyceæ in 66 per cent., Algæ in 77 per cent., Infusoria in 88 per cent.

Asterionella occurred in 77 per cent. of the samples, reaching a quantity significant with regard to odor only in June. Melosira occurred in 88 per cent., the fluctuations being to some extent in inverse ratio to the Asterionella.

Organisms capable of producing disagreeable odors and tastes in water, such as Asterionella, Clathrocystis, Dinobryon, etc., were found. Only Asterionella, however, occurred in numbers sufficient to justify its connection with odors actually produced, and this but a few times.

The bacterial quantitative results at the outlet of this basin present a more or less inverse relation to the counts of the microscopical organisms.

RIDGEWOOD RESERVOIR; INLET TO BASIN NO. 1 (EASTERN).

Seventeen chemical analyses were made of the water entering this basin.

The color ranged between .30 and .05 from July to October. The turbidity was very slight for most of the time between May and October. From the middle of July considerable sediment was

noted, with but one exception. The odor was vegetable in character and not very decided.

The free ammonia results varied between zero and .0080 parts, of which about 81 per cent. were between .0030 parts and .0050 parts. The albuminoid ammonia fluctuated between .0022 parts and .0148 parts, and the results were distributed as follows:

Percentage results below .0100	[parts per 100,000]	= 64.7
" " between .0100 and .0150		= 35.3

Nitrites were obtained six times during August and September, but never were above .0002 parts. The nitrates, during July, August and September, averaged .0698 parts, rising as high as .0930 parts, and falling as low as .0530 parts.

The oxygen consumed followed the color quite closely.

The total solids are about twelve or thirteen parts and the fixed solids nine or ten parts. The ten hardness results gave an average of 4.7 parts. The sixteen chlorine determinations gave an average of 2.31 parts. Two iron determinations gave .0070 and .0050 parts, respectively.

As has been previously described, the entrance to Basin No. 1 is practically the same as the entrance to Basin No. 2. Parallel analyses made of the water from this influx chamber, as it entered Basin No. 2, showed it to be essentially the same water, and therefore the results are not discussed.

It was noted that in comparing the water entering Basin No. 1 with the water leaving it, practically no change in the color occurred, and the sediment had largely disappeared. The albuminoid ammonia increased somewhat. The nitrates decreased slightly for the period between July and October.

The chlorine averaged 2.31 parts as it entered the basin, and only 2.19 parts as it left it.

In Basin No. 2, similar conditions prevailed respecting the color, turbidity and sediment. The albuminoid ammonia increased a very little, but not as much as in Basin No. 1. The nitrates decreased very little. The chlorine averaged 2.32 parts as it entered the basin, and only 1.93 parts as it left it. The probable causes of these changes will be taken up later.

The inlet of Basin No. 1 gave microscopical counts almost uniformly very much lower than the outlet. On July 14th this relation was reversed. The genera found at the inlet of this basin were practically the same as those found at the outlet, but in far smaller quantities and with much less constancy.

One source from which the Asterionella has been derived is shown by the occurrence of Asterionella at the inlet of this basin on one occasion. It is not reasonable to believe that Asterionella could exist in the supply ponds of the water shed, as has been previously shown to be the case, without occasionally reaching the Reservoir. The proof is here given that such transfer does actually take place.

Seven bacterial quantitative examinations at the inlet, during May and June, showed all the counts higher than the corresponding counts on the outlet, except on May 10th. For the subsequent period the counts approximated each other more closely.

The inlet of Basin No. 2 gave counts on seven microscopical examinations, previous to the period of heavy rain-fall, uniformly lower than those on the outlet. For the subsequent period the counts approximated each other more closely.

The genera found at the inlet corresponded more or less with those of the outlet, but are found with less constancy and in smaller quantities.

At this inlet the bacterial counts, up to the end of July, were fairly parallel with those obtained from the outlet. After that time the relation is less close.

RIDGEWOOD RESERVOIR; OUTLET TO BASIN NO. 3 (WESTERN).

Seventeen chemical analyses were made of the water collected at the outlet to this basin.

The color ranged between 0.40 and .07, with a general tendency downward, from the latter part of July to the 1st of October. The turbidity and sediment were slight, and the odor usually vegetable, but aromatic on the 14th of July and on the 16th of September.

The free ammonia ranged between zero and .0056 parts, and the

albuminoid ammonia between .0076 parts and .0255 parts. The latter results are distributed as follows :

Percentage results below	.0100	[parts per 100,000]	=25.0
" " between	.0100 and .0150		=50.0
" " "	.0150 and .0300		=25.0

Nitrites were found five times in the nine analyses, between July and October, but never above .0002 parts. Nitrates for the same period ranged between .0350 parts and 0.670 parts, and averaged .0530 parts. The oxygen consumed followed the color quite closely.

The total and fixed solids were about ten parts and seven parts respectively, and the average of the nine hardness results obtained between July and October gave 3.4 parts.

The chlorine determinations gave an average of 1.70 parts for the seventeen determinations. The monthly averages were as follows :

1897.	Chlorine [parts per 100.000].
May	1 57
June	1.67
July	1.74
August	1.95
September	1.77

RIDGEWOOD RESERVOIR; INLET TO BASIN NO. 3 (WESTERN).

Seventeen chemical analyses were made of the water collected at the inlet to this basin.

The color varied between .45 and .05 during July, August and September. Very little turbidity was observed, but from the middle of July considerable sediment was found in every sample, excepting one. The odor was, as a rule, vegetable, and not very marked.

The free ammonia ranged between .0012 parts and .0056 parts and the albuminoid ammonia between .0049 parts and .0146 parts.

The latter results were distributed as follows :

Percentage results	below .0100	[parts per 100,000]	=76 5
" "	between .0100 and .0150		=23.5

Nitrites were found in only three instances, and then never above .0001 part. Nitrates, for the months of July, August and September, varied between .0430 parts and .0650 parts, averaging .0543 parts.

The oxygen consumed figures followed the color very closely.

The total solids were about nine or ten parts and the fixed solids six or seven parts. The average of ten hardness determinations gave 3.3 parts. The average of the chlorine results was 1.5 parts.

Two iron determinations gave .0050 parts each.

A comparison of the analyses of the water as it enters and leaves this basin showed it to have undergone little change in color, turbidity or odor. The suspended matter seems to have largely settled out in the passage of the water through the basin.

The albuminoid ammonia increased somewhat in the passage, and the chlorine appeared also in larger amounts at the outlet than at the inlet, averaging for the seventeen determinations 1.70 and 1.57 parts, respectively.

MICROSCOPICAL AND BACTERIAL EXAMINATION OF BASIN NO. 3 (OUTLET).

Six microscopical examinations of the water from the outlet of Basin No. 3, from April 24th to May 29th, showed a gradual increase from 983 organisms per C. C. to about 20,000 organisms per C. C. A heavy rain-fall at this time corresponded with a diminution in the number of the organisms, which by the end of July fell to a count of 17 organisms per C. C., followed at the end of September by a slight rise.

The total number of individual genera was 31.

Diatoms were found in 100 per cent. of the samples, Infusoria in 63 per cent. Asterionella occurred in 100 per cent. of the samples, reaching its maximum quantities in May and June ; Melosira was found in about 70 per cent., Synedra in about 73 per cent. Asterionella was the only organism found in quantities suffi cient to account for disagreeable odors and tastes in the water.

Seventeen bacterial quantitative examinations at the outlet, from April to October, showed a general relation to rain-fall and, very distinctly, an inverse relation to the microscopical organisms.

MICROSCOPICAL AND BACTERIAL EXAMINATION OF BASIN NO. 3 (INLET).

The microscopical examinations at the inlet of Basin No. 3, gave in general the same genera as those at the outlet, but with less constancy and in much smaller quantity.

The bacterial quantitative examinations at the inlet to this basin yielded counts uniformly low, and with no definite relation to the counts at the outlet, although the fluctuations correspond to some extent with the rain-fall.

During the period of high microscopical counts at the outlet the bacterial counts at the inlet were higher than those at the outlet.

During the period of heavy rain-fall, when the microscopical organisms were few in number, this relationship was lost.

RIDGEWOOD PUMPING STATION, OLD PLANT.

Sixteen chemical analyses were made of water collected from a tap in this pumping station.

The color ranged between .30 and .07 from the 14th of July to the 1st of October, and slowly diminished from the former to the latter date. The turbidity was, as a rule, very slight. The sediment was slight except during the latter part of July and the first of August, when considerable was noted.

The odor was vegetable in character and not very marked ; an aromatic odor was obtained on the 14th of July.

The free ammonia ranged between .0026 parts and .0064 parts, and was, on the whole, quite uniform.

The albuminoid ammonia results varied between .0059 parts and .0206 parts, and were distributed as follows:

Percentage	results	below	.0100 [parts per 100,000]	= 68.8
"	"	between	.0100 and .0150	= 25.0
"	"	"	.0150 and .0300	= 6.2

Nitrites were found five times during August and September, but

never above .0001 part. Nitrates varied between .0400 and .0750 parts from July to October, and averaged 0.556 parts.

The total solids were about twelve or thirteen parts, and the fixed solids about eight or nine parts. The average of the ten hardness determinations was 4.6 parts.

The sixteen chlorine results gave an average of 2.19 parts, and the monthly averages were as follows:

1897	Chlorine [parts 100,000]
May	1.90
June	1.90
July	2.46
August	2.46
September	2.68

A comparison of the chemical analyses made of the water collected at this Pumping Station, and of the water entering Basins Nos. 1 and 2 of the Ridgewood Reservoir show a marked similarity.

Eighteen microscopical examinations, from April to September, showed a general quantitative relation to the corresponding examinations at the inlets of Basins Nos. 1 and 2, with occasional wide differences.

Considering the agitation the water undergoes on entering the influx chamber of these two basins and the numerous currents there set up, it is natural that such differences should occur.

The genera found correspond in kind with those of the watershed and of the Reservoir as would naturally be the case.

Asterionella was found on June 7th in this Pumping Station, forming another link in the chain of evidence demonstrating the infection of the reservoirs with Asterionella derived from the water-shed.

Seventeen bacterial examinations for the same period yielded counts running more or less parallel with those of the inlets of Basins Nos. 1 and 2, but usually somewhat higher.

RIDGEWOOD PUMPING STATION, NEW PLANT.

Seventeen chemical analyses of water collected from a tap in this station were made.

The color varied from .42 to .06 from July to October, with a general tendency to diminish during this time.

The turbidity and sediment were slight, excepting that twice, during the heavy rain-fall in the latter part of July, considerable sediment was noted.

The odor was vegetable in character for the whole period covered by the examinations.

The free ammonia fluctuated between .0012 parts and .0042 parts, and was quite uniform.

The albuminoid results ranged between .0038 parts and .0184 parts, and were distributed as follows:

Percentage results below	.0100	[parts per 100,000]	= 64.8
" between	.0100 and .0150		= 29.4
" "	.0150 and .0300		= 5.9

Nitrites were noted only three times, and these all occurred in September, but were never over .0001 part. Nitrates ranged between .0430 parts and .0750 parts during July, August and September, and averaged for this period .0581 parts.

The total solids were about ten parts and the fixed solids about seven parts.

The average of the nine hardness determinations gave 3.2 parts.

The average of the seventeen chlorine determinations was 1.62 parts, and the monthly averages were as follow:

1897	Chlorine [parts per 100,000]
May	1.46
June	1.60
July	1.63
August	1.71
September	1.81

A comparison of the chemical analyses made of the water collected at this Pumping Station and of the water entering at the inlet to Basin No. 3 of the Ridgewood Reservoir showed a marked similarity.

Seventeen microscopical and bacterial examinations, from May to October, showed a general relation between the results at this pumping station and those obtained at the inlet to Basin No. 3, but the relation is not close.

Asterionella was obtained once at this pumping station.

No attempt has been made to differentiate the genera obtained at the two pumping stations from each other.

Most of the genera found on the water-shed have been found also at the Ridgewood Reservoir or its Pumping Station, at various times.

Fifteen examinations for sewage bacteria made at the Pumping Stations and at the inlets and outlets of the three Basins yielded one positive result, in June.

DRIVEN-WELL PLANTS.

The increasing demand in the City of Brooklyn during the last fifteen years for a larger quantity of water has obliged the city to develop to the utmost the old sources of supply and to seek new ones. The surface supply from the small streams, which had been utilized for many years, began to prove inadequate, and as far back as 1870 suggestions were made that the surplus water in certain of the ponds should be pumped out to supply the deficiency. The suggestion was acted upon later; but still the quantity of water was insufficient. In 1882 the first contract for driven-well plants was made and the two pumping stations at Forest Stream and Clear Stream were erected. In 1888 a driven-well plant was started at Baiseley's; and in 1891, a water famine becoming imminent, another driven-well plant was started at Jameco Park. The need of the surface supply east of Rockville Centre became more pressing and the contract for this extension was awarded, the work being completed in 1893. Even this increase was not sufficient, and in 1894 contracts were made to still further develop the supply on the new water-shed by means of a series of driven-well plants.

The following driven-well plants, situated east of Rockville Centre, and south of the conduit, were erected in consequence:

Massapequa	Driven Well Plant.
Wantagh	" "
Newbridge or Matawan	" "
Merrick	" "
East Meadow or Agawam	" "

The Massapequa, Wantagh, Newbridge and East Meadow driven-well plants are all situated immediately south of the respective ponds after which they are named. The Merrick plant is situated between the Newbridge and East Meadow plants, and about equidistant from each.

All of these plants discharge the water from the pumps into weir-boxes, from which it flows by gravity through iron pipes into the brick conduit.

The samples for analysis were taken from the weir-boxes, and represented the water entering the conduit at that time. The

driven wells at these pumping stations comprise both deep and shallow wells ; but no attempt was made to analyze the water from them separately.

The Watt's Pond Driven Well Plant, situated on the western and northwestern sides of Watt's Pond, has been previously described and the analyses discussed.

West of Watt's Pond and south of Clear Stream Pond is the Clear Stream plant. A short distance west of the pumping station of the latter, and east of Springfield Pond, is situated the Forest Stream plant.

The Jameco Park plant lies directly south of Baiseley's Pond and north of the conduit. Water is obtained from both deep and shallow wells at this station. Southwest of Baiseley's Pond, immediately north of the conduit, and a short distance west from the Jameco pumping station, is situated Baiseley's Driven-Well Plant.

About two and one-half miles west of Baiseley's pumping station is situated the Spring Creek plant. This consists of two pumping stations, known as the Old and the New Plants. Water is obtained in the old plant from both deep and shallow wells, but in the new plant from shallow wells only. These wells all lie north of the conduit.

Between the Spring Creek pumping station and Baiseley's pumping station, and about a mile west of the latter, are located two new driven-well plants, called the Oconee and Shetucket plants.

These also lie north of the conduit and discharge the water from the pumps through weir-boxes and thence by iron pipes into the conduit.

With the exception of samples of water collected from the weir-boxes at the Oconee plant and at the Spring Creek plant, all the other samples from the driven-well plants west of Rockville Centre have been collected from the taps in the pumping stations.

No examinations have been made of the water from the New Utrecht and Gravesend pumping stations.

The estimated yield of these various driven-well plants is as follows :*

* Report City Works Dept., Div. Water Supply, 1897.

PUMPING STATIONS.	U. S. GALLS.
Massapequa, deep and shallow wells......	5,200,000
Wantagh, " " " "	2,000,000
Newbridge, " " " "	4,500,000
Merrick, " " " "	4,300,000
East Meadow, " " " "	4,000,000
Watt's Pond, driven wells....	2,000,000
Clear Stream, " "	3,000,000
Forest Stream, " "	3,000,000
Jameco, deep wells....................	4,500,000
Jameco, shallow wells..................	2,000,000
Baiseleys, deep wells............	2,200,000
Spring Creek, deep wells.....	2,000,000
Spring Creek, shallow wells (old plant)...	3,000,000
Spring Creek, " " (new plant)...	3,500,000
New Utrecht, " "	900,000
Gravesend...	1,700,000

The following facts are to be noted in connection with the position of certain of the driven-well plants.

A small private cemetery is situated within 200 feet and to the west of one of the well-mains of the Wantagh plant; the slope of the land is from the cemetery towards the wells.

At the Forest Stream and Jameco Park plants some of the wells are sunk in the beds of the streams formed by the overflow from Twin Ponds and Baiseley's Pond respectively.

The Spring Creek plant is situated on the outskirts of East New York.

The chemical analyses of the water made from the different driven-well plants were scattered over a period between the middle of December, 1896, and the 1st of October, 1897.

An inspection of the results of these analyses brings out the following facts:

The free ammonia of the wells east of Rockville Centre—*i. e.*, on the new water-shed, did not rise above .0026 parts, and the average was considerably less. The albuminoid ammonia was also low, rising to .0062 parts in only one* instance, and, as a rule, was much below .0038 parts. The nitrates are somewhat variable and ranged between zero and .0500 parts, the latter result being obtained on the Merrick Wells. No nitrites are recorded as having been found.

* Phenol sulphonic acid method.

The averages of the total solids results ranged between 4.48 parts for the Wantagh Wells and 10.10 parts for the Agawam Wells. The hardness averages ranged between .9 and 1.5 parts.

The averages of the chlorine results were as follows :

Place.		No. of Analyses.	Chlorine (parts per 100,000).
Massapequa Weir Box..		13	.57
Wantagh	"	16	.46
Newbridge or Matawan	"	5	.58
Merrick	"	14	.58
Agawam	"	4	1.89

The iron determinations were limited in number and the interpretation of the results has only such weight as the few figures at hand will permit.

It would appear that more iron was present in the Massapequa and Wantagh Wells than in either the Matawan or Merrick Wells. An unpleasant odor of sulphur and the rusty appearance of the weir boxes at Massapequa and Wantagh seems to confirm the fact of the presence of considerable iron. But doubtless the quantity in the water is variable and depends a great deal on the extent to which the wells are pumped.

The Clear Stream and Forest Stream Wells appear to be similar to each other in some respects.

The free ammonia in the Clear Stream Wells fluctuated between zero and .0024 parts and the albuminoid ammonia between .0003 and .0038 parts. Nitrites were recorded once, and the nitrates* appeared each time in considerable amount. The latter ranged between .1200 and .2000 parts.

The Forest Stream Wells showed higher free ammonia, ranging between .0021 and .0088 parts, and the albuminoid ammonia results varied between zero and .0044 parts, with but one exception, when .0092 parts were obtained. Nitrites were recorded once, and the nitrates were considerably lower than in the Clear Stream Wells, not rising above .0350 parts.

The averages of the hardness, total solids and chlorine determina-

---

1. Phenol sulphonic acid method.

tions are given in the following table. They are, with the exception of the chlorine results, distinctly higher than the corresponding results obtained on the water from the eastern wells just described.

Averages of the Total Solids, Hardness, and Chlorine

[parts per 100,000].

Place.	No. Analyses.	Total Solids.	No. Analyses.	Hardness.	No. Analyses.	Chlorine.
Clear Stream Pumping Station Tap	9	8.28	5	2.5	17	0.61
Forest Stream Pumping Station Tap	9	7.09	6	2.3	17	0.60

The determinations of iron gave higher results for the Forest Stream Wells than for any of the wells east of them. The average of two determinations was .0700 parts. An average of three determinations on the water from the Clear Stream Wells gave .0290 parts.

This latter result is more comparable with the results obtained at Massapequa and Wantagh than with those from Forest Stream.

The Jameco Park Wells are of two kinds, deep and shallow. While they show certain similar characteristics, they are apparently derived from different sources, which is chiefly indicated by their chlorine contents. The free ammonia obtained from both the deep and shallow wells was about the same, ranging between .0354 parts and .0660 parts. The average of the albuminoid ammonia results gave .0065 parts for the deep wells and .0056 parts for the shallow wells.

The nitrites were absent in the water from the deep wells, but practically always present in the water from the shallow wells, having been found in the latter twelve out of thirteen times. The nitrates* are quite low in the deep wells, ranging between .0030 and .0050 parts, while in the shallow wells they range between .0120 and .0330 parts.

---

* Phenol sulphonic acid method.

An inspection of the total solids results indicates that the shallow wells were slightly higher in mineral contents than the deep wells. The hardness was about the same in both, but the chlorine was over three times as great in the shallow wells as in the deep wells. It has been stated that the difference in the mineral constituents of the deep and shallow wells of this section, at the Jameco Park, Baiseley's and Spring Creek, was due to the partial infiltration of sea-water into the shallow wells. This explanation is probably true, as the chlorine results in these cases point to quite different sources for the water in the two classes of wells.

The differences are well brought out in the following table :

Averages of Total Solids, Hardness and Chlorine

[parts per 100,000].

Place	No. Analyses	Total Solids.	No. Analyses	Hardness	No. Analyses	Chlorine.
Jameco Park, Shallow Wells	9	12.88	8	6.6	17	0.68
Jameco Park, Shallow Wells	7	14.67	5	5.8	13	2.39
Baiseley's Wells	9	38.51	9	9.8	17	11.45
Spring Creek, Old Plant, Shallow Wells	7	66.23	7	21.4	9	17.14
Spring Creek, Old Plant, Deep Wells	7	18.16	7	11.6	9	0.61
Spring Creek, New Plant, Shallow Wells	7	23.61	7	11.6	9	1.12

The iron obtained from the Jameco Park shallow wells showed .1100 parts as the result of an average of two analyses. This is a larger amount than was obtained from any of the other wells. The water sometimes developed a milky appearance on standing, showing that the iron was present originally as a ferrous salt, and on exposure to the air began to oxidize and to precipitate out of the water.

The free ammonia derived from Baiseley's wells is very much

less than that obtained from the Jameco Park wells, ranging between .0014 and .0038 parts. The albuminoid ammonia varied between .0002 and .0048 parts.

Nitrites were recorded three times, but were never above .0005 parts.

Nitrates* showed amounts during August and September ranging between .0430 parts and .0700 parts.

The total solids in the water are higher, as the above table shows, than in any of the other wells, with the exception of the Spring Creek (old plant) shallow wells. This is also true of the chlorine. The hardness is higher than in the Jameco Park wells, but lower than in the Spring Creek wells.

The iron, as far as the three determinations in August and September showed, averaged only .0287 parts, which was much lower than the Jameco Park wells for the same period.

The deep and shallow wells of the Spring Creek plants, as the table previously given shows, are somewhat different as regards the amounts of the mineral constituents which they respectively contain. They differed very little as regards the amount of nitrogen present as free and albuminoid ammonia, only varying between zero and .0044 parts for the former, and between zero and .0044 parts for the latter. Nitrites are recorded twice in the case of the shallow wells of the new plant, but never in the others. The nitrates, however, were quite high in August and September in the shallow wells of the old plant, ranging between .1850 parts and .2650 parts, while the new plant shallow wells showed very much higher amounts, varying between .5700 parts and .6700 parts.

The nitrates of the deep wells of the old plant for the same period ranged between .0070 and .0120 parts.

The total solids from the shallow wells of the old plant averaged 66.23 parts for seven determinations, which is the highest average obtained from any of the wells of the water-shed.

The chlorine and hardness results were also higher than on any of the other wells examined.

---

1. Phenol sulphonic acid method.

The old plant deep wells corresponded fairly well in solids with the new plant shallow wells, except that the latter are somewhat higher. The hardness was the same on these two sets of wells, and averaged 11.6 parts. The chlorine of the deep wells was, however, quite low, being only a little over half the quantity present in the shallow wells. Reference to the preceding table will show the relative amounts of chlorine and total solids present in these three sets of wells.

The iron in the shallow wells of the old and new plants, in August and September, was between .0050 and .0080 parts. The deep wells of the old plant, however, gave an average for three determinations, .0250 parts.

One analysis was made of the water from the Oconee Driven-Well Plant, and is given in the tables.

MICROSCOPICAL AND BACTERIAL EXAMINATION OF DRIVEN WELLS.

The driven wells on the water-shed have been examined only occasionally for microscopical organisms and for bacteria. This has been due, partly, to the fact that certain of the eastern driven-well plants were in service for short periods only, and that these periods often failed to correspond with those days on which samples could be collected; partly to the fact that the microscopical and bacterial results from ground waters have but slight significance, as a rule, compared with their significance where surface waters are concerned ; partly, also, because the chief object of the work was to determine the general condition of the water-shed, and the surface waters naturally called for closer and more constant attention.

The results obtained have confirmed the generally established rule that ground waters yield but few microscopical organisms. For the microscopical results, tables have been arranged, giving the number of times the water from each driven-well station was analyzed, and the number of times each genus was found in quantities of five or more per C. C., and in quantities less than five per C. C.

The bacterial quantitative results indicate the existence of a general relation between the number of bacteria found and the relative

purity of the different ground waters examined. Comparatively little attention has hitherto been given to this question.

It will be seen that wide bacterial variations occur in the ground waters of both the relatively polluted and unpolluted sections of the shed. Nevertheless, the relatively pure waters present few fluctuations which are at all high, rarely reaching the counts typical of the average "good" surface water of this shed. Certain of these high counts may further be explained by local conditions. For instance, those of September 13th at Massapequa, Wantagh and Merrick correspond with the resumption of pumping at these stations, after more or less prolonged periods during which they were out of service.

The weir boxes from which the samples were taken had been lying unused and contained some stagnant water; it seems reasonable to conclude that to this stagnant water exposed for some time to the air, the high counts were, in part at least, due, and this is confirmed by the return of the counts to the usual low point after the plants had been running for some time, as shown by the samples of September 30th. It may be also that more or less multiplication had taken place in the pipes of the well plants, while out of service. The averages have been obtained by omitting such high counts. The figures thus omitted have been printed in heavy type.

It will be seen that the average of the usual low counts does not exceed about 10 bacteria per C. C. for the unpolluted section.

The relatively impure ground waters of the shed show, on the other hand, counts which are more constantly high, yield higher averages, and present more frequent and wider fluctuations. The averages have been compiled as before, omitting the very high counts.

It is not intended that due weight shall not be given to these high counts, but their extreme variation from the counts usually obtained would render averages of little significance if they were included. It would appear, then, that notwithstanding the natural filtration which ground waters undergo before being drawn from a driven-well, the number of bacteria present, while certainly fewer

1. But See "Mass. State Board of Health Report. 1894. Sedgwick and Prescott."

as a rule than those of most surface waters, correspond to a certain extent with the relative purity of the source of supply.

Comparison with the results of the parallel chemical examinations on these wells, together with the knowledge of the wells themselves and their surroundings, obtained by inspection, bears out the general proposition as stated above.

SUMMARY AND CONCLUSIONS.

CHEMICAL.

In order to logically arrive at the relative condition of the several surface supplies, it is necessary to draw comparisons between them, with respect to the nature and extent of the organic and mineral matter which they contain.

Sixteen sources of supply are compared below in this way. Watt's Pond has not been classed in this list on account of the fact that well water was often mixed with the surface water, and a discussion of this pond by itself is more proper.

The physical characteristics of these sixteen waters vary to some extent. They are, as a rule, free from any considerable amount of turbidity or sediment. In this respect they are affected by heavy rains only to a slight degree. Springfield and Clear Stream Ponds and Hempstead Storage Reservoir have shown more sediment than any of the others.

Baiseley's Pond, on account of the large number of microscopical organisms it contained, showed more turbidity than any of the other ponds.

The odors obtained from these sixteen waters were vegetable in character, sometimes marshy, but never very strong. Schodack Brook and East Meadow Pond were persistent in giving unpleasant and disagreeable odors also, which were probably due to the decaying vegetable matter with which the water came in contact. The fishy, aromatic and grassy odors were in several instances traced to microscopical organisms. Springfield Pond and Baiseley's Pond afford the best examples of the latter class of odors.

The differences in color of the various waters and the extent to which some of the ponds are affected by the heavy rains, while others are either not affected at all or only slightly, are quite remarkable. Averages of the color readings, between July and Oc-

tober (the period during which determinations were made), showed the following grouping: Hempstead Storage Reservoir, Twin Ponds, Pine's Ponds, Schodack Brook, Tanglewood and Clear Stream Ponds gave averages between .07 and .13 of color.

Valley Stream Reservoir, Smith's, Hempstead, Millburn and Wantagh Ponds gave averages ranging between .18 and .33 of color. Springfield, Baiseley's, East Meadow, Newbridge and Massapequa Ponds gave averages ranging between .38 and .75 of color.

The five eastern ponds, Massapequa, Wantagh, Newbridge, East Meadow and Millburn, were very much affected by the heavy rains in June and July. Their color gradually diminished during the subsequent months.

Valley Stream Reservoir, Springfield and Baiseley's Ponds were also affected in about the same degree. The remaining ponds were either affected very little or not at all.

The coloring matter in the eastern ponds is due principally to the low swampy country through which their feeders run. The organisms in Baiseley's Pond have influenced the color to some extent, while the color of the water at Springfield Pond must be attributed to the large amount of decaying vegetable matter in and about Durland's and Gross' Ponds, which are feeders of Springfield Pond, and the low land in the immediate vicinity.

The coloring matter of all the other ponds is also due to vegetable matter, dissolved out of the soil. But as they receive their supply of water from areas more or less cultivated, they exhibit relatively less color.

The correspondence of the color with the oxygen consumed has been marked on all the waters, and as checks upon each other the two determinations have been valuable.

The amount of organic matter which a water contains is well shown by the nitrogen obtained as albuminoid ammonia. But the significance of the amount so determined is dependent on its character rather than on its quantity. It must therefore be constantly borne in mind that a knowledge of the source of the organic matter, its physical characteristics and its susceptibility to change are necessary for an intelligent interpretation of such results.

The heavy rains during June and July and the consequent rise of the water with the flooding of the low areas, particularly on the

eastern portion of the water-shed, caused a marked increase in the albuminoid ammonia during that period. This increase was coincident with the rise in color of the water, and the nitrogen obtained must therefore be attributed to the vegetable matter introduced as above described.

To show this effect, Massapequa and Wantagh ponds may be taken as examples. The following table shows the monthly averages of the total albuminoid ammonia results on each of the ponds, beginning in January and running to October, and the monthly rain-fall for the same period :

MONTHLY AVERAGES OF TOTAL ALBUMINOID AMMONIA RESULTS FOR MASSAPEQUA AND WANTAGH PONDS
AND
MONTHLY RAIN-FALL FROM JANUARY TO OCTOBER.
(parts per 100,000).

1897	Massapequa Pond. Total Albuminoid.	Wantagh Pond. Ammonia.	Rain-fall in Inches.
January.......	.0047	.0042	4.14
February......	.0062	.0039	3.20
March.......	.0076	.0067	3.36
April	.0130	.0097	3.12
May..........	.0211	.0123	5.44
June.........	.0243	.0184	4.02
July...... ...	.0322	.0235	11.19
August.......	.0153	.0149	4.07
September	.0789	.0110	1.90

It will be seen that from March until the end of July there was a gradual increase in the amount of albuminoid ammonia obtained from these ponds, and that June and July show the highest results. Thirty-seven and one-half per cent. of the total rain-fall for the nine months fell in these two months of June and July.

The rapid decrease in the amount of albuminoid ammonia during August and September is surprising, unless the decrease in rain-fall and the sandy character of the soil are taken into consideration. As was shown in the discussion of the analyses of the water from Massapequa Pond, the decrease in the albuminoid ammonia ran nearly parallel with the decrease in color and the rise in nitrates.

It would seem that as the level of the ground water fell during

August and September the rain which was precipitated, passed into the subsoil to a relatively greater depth than when the ground water level was higher. The fine gravel and sand of this subsoil acted as a filter, removing and oxidizing, with the assistance of the bacteria, the vegetable matter derived from the surface soil. A considerable amount of this now colorless ground water found its way into the streams and ponds, and mingling with the more or less colored surface water, caused a diminution in the color, a fall in the albuminoid ammonia and rise in the nirtates.

What was true in the case of Massapequa Pond was also true of all the other eastern ponds to a limited extent.

In discussing the color of the surface waters, Valley Stream Reservoir, Springfield Pond and Baiseley's Pond were all noted as having been affected by the heavy rains of July.

Valley Stream Reservoir and Spring Pond showed, also, in the monthly average of their albuminoid ammonia results, a gradual rise to July and a subsequent fall. Baiseley's Pond, on the other hand, increased regularly each month from January to September, except that the rains of July caused a diminution instead of an increase in that month. This was due probably to the effect of dilution and to the checking of the very rich microscopic growths which infested this pond.

The following table shows the regularity of the increase in the albuminoid ammonia and the microscopical organisms in the water from Baiseley Pond :

MONTHLY AVERAGES OF TOTAL ALBUMINOID AMMONIA
AND OF
TOTAL ORGANISMS FOR BAISELEY'S POND, FROM JANUARY TO OCTOBER.

1897	Total Albuminoid Ammonia (parts per 100,000.)	Total Organisms (per c. c.)
January	.0118	———
February	.0132	54
March	.0151	386
April	.0300	1,245
May	.0501	3,996
June	.0897	4,154
July	.0779	2,134
August	.0942	6,480
September	.0954	4,690

The ponds which gave rather low color and which do not seem to have been seriously affected by the heavy rains of June and July in this respect, have also shown a similar regularity in the rise of their albuminoid ammonia between January and July, and in its subsequent fall. While a certain amount of vegetable coloring matter was washed into these ponds, the larger proportion of the organic matter was colorless, nevertheless showing itself as albuminoid ammonia.

Clear Stream pond and Hempstead Storage Reservoir showed the highest monthly average for albuminoid ammonia in May. Twin, Smith's and Hempstead Ponds, on the other hand, showed the highest averages in June and July. Schodack Brook had two high averages approximately the same, in May and July. Pine's and Tanglewood Ponds are somewhat irregular, due to the cleaning of the former pond in the early spring.

In considering the variations in the albuminoid ammonia results, considerable attention has been given to the effect of the heavy rains of July.

Their effect was more noticeable on the eastern ponds because of the fact that the color acted there as a sort of indicator, and also because the vegetable organic matter introduced showed itself in proportionately larger amounts than it did on the western ponds. But it is true that, with but one or two exceptions already accounted for, all the surface supplies increased in albuminoid ammonia, from January to July, and decreased during the subsequent months (see table, Part II).

It is evident that the increase in the albuminoid ammonia was coincident with the increase in temperature. It would appear that, leaving out the effect of the rains, the warm summer months caused an increase in the organic matter, as evidenced by this determination.

This is what might be expected, since the vegetable and animal life in surface waters increases at this season of the year.

It is, therefore, probable that two factors—the natural increase of vegetation in the water and the heavy rains of July—combined to cause the increase under discussion.

The average of the albuminoid ammonia results for each of the surface supplies for the whole period covered by the investigation,

is shown by the following table. The table also includes the averages of the free ammonia for the same period.

TOTAL AVERAGES OF ALBUMINOID AMMONIA AND FREE AMMONIA FOR NINE MONTHS.

	Total Albuminoid Ammonia. [Parts per 100,000.]	Free Ammonia.
Massapequa Pond	.0145	.0006
Wantagh "	.0110	.0006
Newbridge "	.0109	.0005
East Meadow "	.0114	.0010
Millburn "	.0101	.0008
Hempstead Storage Reservoir...	.0141	.0009
Schodack Brook...............	.0094	.0044
Hempstead Pond..............	.0140	.0016
Smith's "	.0100	.0022
Pine's "	.0144	.0009
Tanglewood "	.0097	.0014
Valley Stream Reservoir.......	.0159	.0047
Clear Stream Pond............	.0123	.0051
Twin Ponds.....	.0086	.0040
Springfield Pond..............	.0150	.0067
Baiseley's "	.0467	.0033

The albuminoid ammonia figures in the above table may be taken as indicating the relative amounts of organic matter present in these waters. It will, therefore, be seen that no very wide differences in the amounts of organic matter were found in the surface waters of the shed, with one or two exceptions, capable of being explained by local causes.

A distinction should be drawn, however, between waters having practically the same amount of albuminoid ammonia, but coming from different sections of the water shed.

The high color of the water of Massapequa Pond accounts for its high average in albuminoid ammonia. Approximately the same average is obtained for Hempstead Storge Reservoir, but is there doubtless due to the rich microscopical growths so constantly present in the reservoir, and to other nitrogenous matter of a different character from that in Massapequa Pond, as shown by the pres-

ence in the water of nitrites and nitrates in considerable quantities.

Hempstead Pond would appear to derive its albuminoid ammonia from stable vegetable organic matter. Its color is considerably greater than Hempstead Storage Reservoir, although it is situated so close to the latter. The same is true in regard to Valley Stream Reservoir, except that a certain amount of its nitrogenous matter is unstable, as shown by the frequency with which nitrites occur, and by the high nitrates. At Springfield Pond the high albuminoid ammonia must be attributed to vegetable coloring matter, and to unstable nitrogenous matter of a doubtful character. Clear Stream and Twin Ponds gave averages of .0123 parts and .0086 parts, respectively.

These amounts are rather low, and between them lie the averages of the best waters of the shed. Nevertheless, from the large amount of nitrites and nitrates present, it must be inferred that the organic matter in these two ponds is capable of rapid change, indicating sewage pollution. It is more the susceptibility of nitrogenous matter to change which awakens suspicion, than the actual quantity present.

The two supplies, Schodack Brook and Millburn Pond are, to a certain extent, open to doubt, from the fact that they both contain high nitrates, relatively high chlorine, and have shown the presence of nitrites to a greater or less extent. Schodack Brook presents high free ammonia also.

The extremes obtained in the nitrogen, as represented by the free ammonia, were .0005 parts and .0067 parts.

Newbridge, Wantagh, Massapequa, Millburn and Pine's Ponds, and Hempstead Storage Reservoir gave averages below .0010 parts for the year. East Meadow, Tanglewood, Hempstead and Smith's Ponds gave averages between .0010 parts and .0025 parts; and Baiseley's, Twin, Schodack, Clear Stream and Springfield Ponds and Valley Stream Reservoir between .0033 parts and .0067 parts.

It will be seen that all the supplies east of and including Smith's Pond, with the exception of Schodack Brook, gave results below .0025 parts, the average being only a little over .0010 parts. Schodack Brook gave an average result of .0044 parts for the year. All of the ponds west of Smith's Pond gave results above .0033 parts, and the average was .0047 parts.

This fact very clearly marks a line between the eastern and central sections of the water-shed on the one hand, and the western section on the other. When it is understood that the population increases as Brooklyn is approached, and that the drainage areas necessarily become more polluted, the significance of this fact is evident. The relation which the free ammonia bears to the nitrogen in the form of nitrites is of significance in this connection.

Of those ponds east of Smith's Pond, Newbridge, Massapequa and Hempstead showed no nitrites at all during the year. They were present in Wantagh and East Meadow Ponds twice, and in Millburn, Pine's, Tanglewood and Smith's Ponds from six to ten times, but never above .0005 parts. Hempstead Storage Reservoir, on the contrary, showed nitrites present twenty-one times, rising as high as .0014 parts.

Of the above sources of supply, Hempstead Storage Reservoir, Millburn and Pine's Ponds are open to the most suspicion, although they are relatively low in free ammonia. This latter is due to the oxidation of the ammonia into nitrous compounds through the agency of bacteria. The efficiency of the oxidation is made evident by the low free ammonia, and, as will be shown later, by the relatively high nitrates.

Of those ponds west of Smith's Pond, nitrites were obtained in Baiseley's Pond 5 times, Twin Pond 26 times, Valley Stream Reservoir 8 times, Clear Stream Pond 31 times and Springfield Pond 17 times. Twin Ponds, Clear Stream Pond and Springfield Pond are the sources of supply in which this form of nitrogen was most constantly present, and also those in which the highest amounts were obtained.

These figures furnish one of the most valuable indications of the sanitary condition of the shed, and show well the relative impurity of the western section.

A study of the nitrates* substantiates the inferences already drawn from a consideration of the nitrogen in the three forms of albuminoid ammonia, free ammonia and nitrites. Considerable caution must be observed, however, in making deductions based upon the

* The nitrate averages are based on results obtained by the Phenol Sulphonic Acid Method during July, August and September.

relative amounts of nitrates present, without a knowledge of the physical characteristics of the soil and the extent of the cultivation of the land upon the drainage areas.

If it is remembered that the soil consists almost exclusively of sand and fine gravel, and that the large demand for water keeps the ground level of the water very low, it is easily understood that all the water, practically, falling on the shed receives natural filtration before it reaches the streams and ponds.

On the western portion of the water-shed in particular, and in the central and eastern sections to some extent, the streams and ponds are in the midst of cultivated fields. The organic nitrogen derived from the manure and fertilizers used on the land becomes changed through the action of bacteria into soluble ammonia compounds, which, after further oxidation by means of the same agents, are converted first into nitrous compounds and finally into nitric compounds. It seems reasonable, therefore, to conclude that the rather high nitrates present on this water-shed are the results of the above conditions.

Another factor which must also be included, however, is the pollution of the drainage areas by household and stable sewage. This is well shown by the relatively higher nitrates found on the more thickly populated western section of the water-shed than on the less populated eastern section. Baiseley's Pond is an exception in showing very low average nitrates. This is due to the microscopical growths, so abundant in this pond.

Nitrates furnish soluble nitrogen in a form particularly suitable for the nourishment of plant life. The high nitrates at the inlet to this pond indicate the polluted sources from which the water is derived. The disappearance of the nitrates in the pond shows that they have been again transformed by the microscopical plants into organic nitrogen.

Hempstead, Baiseley's, Massapequa, Smith's, Newbridge, Wantagh and East Meadow Ponds all show averages below .0270 parts. It will be seen that all of the eastern ponds are included in this list excepting Millburn Pond. Besides having more than double the amount of nitrates for the same period than the highest averages obtained for any of the ponds east of it, this pond shows high chlorine and quite often the presence of nitrites.

Hempstead Storage Reservoir, Tanglewood and Pine's Ponds, Schodack Brook and Millburn Pond show averages between .0379 parts and .0590 parts. All these sources of supply have exhibited nitrites with more or less frequency, showing with the nitrates the effect of pollution.

Valley Stream Reservoir, Springfield, Twin and Clear Stream Ponds all show averages above .0700 parts, the two latter giving .2427 parts and .2717 parts respectively. The constancy with which nitrites are found in these supplies, combined with the high nitrates, leaves no doubt regarding their contamination, and that to a dangerous degree, with, perhaps, the exception of Valley Stream Reservoir.

The chlorine results exhibit features of some importance, considered from a sanitary standpoint. The situation of the watershed on the southern side of Long Island, within a short distance of the sea, and the fact that the flat surface of the island offers no hindrance to the passage of storms from the ocean over it in any direction, causes the surface waters to contain considerably more chlorine than would be the case if the sources of supply were situated some distance inland.

This investigation has not been carried on long enough to determine the normal chlorine of this region exactly. However the results permit the assignment of approximate limits for the normal chlorine during the period of observation and a comparison of the various sources of supply on this basis. If from other data the purity of one or more of the sources of supply can be approximately fixed, then we may consider that the chlorine there found represents fairly well the normal of the region. Waters which contain chlorine in excess of these limits must, therefore, be considered with suspicion, as subject to sewage pollution, unless local conditions permit of another explanation.

The drainage areas of the eastern streams and ponds are sparsely populated, and, presumably, the chlorine found in them is derived principally from natural sources. The farther west one goes the greater the population and the more exposed to direct pollution the supplies become.

The following table gives the averages of the chlorine results obtained in the ten months' work :

Averages of Chlorine Results on Sixteen Surface Supplies From December 1896, to October, 1897.

	Chlorine. [Parts per 100,000.]
Massapequa Pond	.59
Wantagh Pond	.54
Newbridge Pond	.65
East Meadow Pond	.61
Millburn Pond	.74
Hempstead Storage Reservoir	.67
Schodack Brook	.64
Smith's Pond	.62
Hempstead Pond	.67
Pine's Pond	.66
Tanglewood Pond	.64
Valley Stream Reservoir	.65
Clear Stream Pond	.79
Twin Ponds	.81
Springfield Pond	1.19
Baiseley's Pond	.98

The lowest average was obtained from Wantagh Pond, the next from Massapequa Pond. If an average of the results on these two ponds is made, a little over .56 parts is obtained. An average of the results on Massapequa, Wantagh and East Meadow Ponds is .58 parts, and if Newbridge Pond is included, the average becomes very nearly .60 parts. The lowest chlorine results obtained were from the Wantagh Wells. Sixteen analyses averaged .46 parts.

The average of the chlorine on the surface waters east of Millburn is considerably above that of the ground water at Wantagh, although the ground water at Massapequa averages .57 parts of chlorine. It is, therefore, probable that a representative amount of chlorine for a surface water on the unpolluted section of the water-shed in its southern part near the sea, lies between .50 parts and .60 parts.

The greater the drainage areas and the farther from the ocean they extend, the less will be the normal chlorine.

The restricted drainage area of Newbridge Pond (2.7 square miles) may be responsible for the rather high chlorine which this

pond shows. East Meadow Pond is open to suspicion more from its bacterial than from its chemical results, although its chlorine is a little above .60 parts. Millburn Pond may have high chlorine on account of its small drainage area, but other determinations point to a certain amount of pollution; and when it is seen that it has higher chlorine than any surface supply east of Clear Stream Pond, this view is confirmed.

The whole of the central group of surface supplies give average results between .64 parts and .67 parts, excepting Smith's Pond, which is .62 parts. Hempstead Storage Reservoir, Hempstead and Pine's Ponds, give the highest results, and from other data the first and last sources of supply are certainly open to suspicion on account of sewage pollution.

Valley Stream Reservoir has high average chlorine although somewhat less than certain of the central group of ponds. Its high free ammonia, nitrates and albuminoid ammonia, together with the not infrequent presence of nitrites, cause it to be regarded as subject to sewage pollution.

The remaining ponds, Clear Stream, Twin, Springfield and Baiseley's have averages ranging between .79 parts and 1.19 parts. The bacterial and chemical analyses as a whole very plainly point to the pollution which these four ponds receive.

The mineral contents of the waters of the eastern ponds are low. The total solids range approximately from four to six parts and the fixed solids from two to four parts.

The central group of ponds does not show very much increase in total solids nor does Valley Stream Reservoir. But all the surface supplies west of the latter are considerably higher ranging approximately from six to twelve parts for total solids and from four to nine parts for fixed solids.

The organic matter which the surface waters contain is readily burned off on ignition and no marked blackening occurs, except at those times when the water of the eastern and certain of the central and western ponds becomes very much colored.

The hardness results of the surface waters group themselves in much the same order as do the total solids.

Averages of the hardness determinations made on all the supplies

east of Valley Stream Reservoir gave figures ranging between .7 parts and 1.2 parts. Valley Stream Reservoir gave an average of 1.6 parts, while all the ponds west of the latter ranged between 2.3 parts and 4.4 parts. Baiseley's Pond gave the highest average result, and the average of the results on Springfield Pond was intermediate between Baiseley's Pond and Twin Ponds. Clear Stream and Twin Ponds were the same.

It has been considered advisable to treat Watt's Pond separately, from the fact that few samples of the unmixed pond water have been obtained. Such samples as have been obtained, however, show the water to contain considerable free ammonia. The albuminoid ammonia was rather low; the nitrates were quite high, and also the chlorine; nitrites were not infrequently found.

The water of the pond is similar in character to that of Valley Stream Reservoir from which it receives a portion of its supply, and may be classed with it from a sanitary standpoint.

Detailed descriptions and comparisons have been made of the various driven-wells, and it only remains to consider their relative sanitary standing and to show their effect on the supply as a whole.

The wells east of Rockville Centre show very low free and albuminoid ammonia, comparatively low nitrates, no nitrites, and with the exception of the Agawam Wells, low chlorine. The iron is not very large in amount and probably would never cause trouble in the supply as a whole. They are safe and wholesome waters and are likely to remain so for some time to come.

The wells west of Rockville Centre are variable in quality. They show some evidences of contamination and other features of an objectionable character. They are, with the exception of the Forest Stream Wells and the Jameco Park Deep and Shallow Wells, rather low in free ammonia. On the other hand, the Jameco Park Wells are extremely high, and on examination of the water from the Oconee Wells also gave very high free ammonia.

The nitrates of the Clear Stream and Spring Creek Shallow Wells are very high; the other wells of this section, with the exception of the deep wells, are also somewhat high in nitrates.

Nitrites have been found in the wells at Clear Stream, Forest

Stream, Jameco Park (Shallow Wells), Baiseley's and Spring Creek (New Plant, Shallow Wells). They were found most constantly in the shallow wells at Jameco Park.

The chlorine is very high in the Jameco Park Shallow Wells and excessive in the wells at Baiseley's and the shallow wells at Spring Creek (Old Plant).

With the exception of the wells at Forest Stream and Clear Stream, all the wells of this section show a great deal of hardness. They also show some iron, but the wells at Jameco Park give by far the largest amount.

The infiltration of sea water into the shallow wells at Spring Creek, Baiseley's and Jameco Park is the probable cause of their high mineral contents.

While the use of water from these wells is not perhaps actually dangerous, it is decidedly objectionable to be obliged to admit them into the city supply. Moreover, these well waters, containing sulphates of lime and magnesium, must have, if introduced into the supply in sufficient quantity, an injurious effect on steam boilers.

A comparison of the water found in the Ridgewood Reservoir with the water found in the various surface supplies or of the shed shows that the former differs considerably in character from the latter.

Its mineral constituents are high, as compared with most of the surface waters of the shed, while its organic matter is, as a rule, somewhat lower. This, of course, is due to the well waters which form so large a proportion of the city supply. The quantity of organic matter present is affected by so many factors, as has been previously shown, that any deductions are worthless from a sanitary standpoint.

The water supplied to the city is hard, as compared with any of the surface waters of the shed and the majority of the well waters, and must be due principally to the ground water derived from the Jameco Park, Baiseley's and Spring Creek Wells.

To these wells must also be attributed the relatively high chlorine found in the water at Ridgewood Reservoir.

BACTERIAL.

The bacterial examinations made during this investigation dealt only with the determination of the numbers present in the waters of the different supplies and with the search for bacteria indicative of pollution from intestinal discharges. The determination of species is discussed elsewhere.

Careful consideration of the figures obtained in the quantitative determinations show certain relations, which are exhibited in the table on the opposite page.

The numbers of bacteria found at the outlet of each of the surface supplies of the shed have been averaged for the whole period of observation (column 1). Averages for the period before the heavy rain-fall of July (column 2) and for the period of heavy rain-fall itself (column 3) have also been made, and the relations of these averages to each other are given (column 4).

The averages at the outlets of the ponds are compared with the averages at the inlets for the period during which the latter were examined (columns 5 and 6), and the ratios of the outlet averages to the inlet averages are shown (column 7).

The averages for the whole period, when arranged in order of magnitude, show a remarkable relation to the topography of the water-shed. The ponds of the eastern section of the shed all give averages lying below 600 bacteria per C. C., and from Wantagh Pond to Millburn Ponds inclusive, the averages increase in order from east to west. Massapequa Pond, the most easterly of all, presents a departure from this rule in showing the highest average of this section.

The central section gives averages lying between 600 and 1200 bacteria per C. C. These averages also increase in exact relation to the order of the ponds from east to west. Hempstead (DeMott's) Pond is the only exception, and is properly classed with the eastern ponds.

BACTERIAL AVERAGES. (No. per c c.)

Column 1 Source.	Jan. to Oct.	Column 2 Source.	Jan. to June.	Column 3 Source.	July to Sept.	Column 4 Source.	Ratio of col. 3 to col. 2.	Column 5 Source.	Bacteria av. at inlets.	Col 6 Bacteria cor. av. at outlets.	Column 7 Source.	Ratio of col. 5 to col. 6.
								INLETS.			FEEDERS.	
Wantagh Pond	382	Newb'dge Pond	192	DeMott's Pond	490	Hemp. Res ..	7.1	Wantagh, west.	530	424	Baiseley's . ..	7.0
DeMott's Pond	392	Wantagh P'nd	199	Baiseley's Pond	492	Newb'dge P'nd	6.0	Smith's, east...	621	420	Smith's, west..	4.8
Newb'dge Pond	398	Hemp. Sto. Res.	257	Pine's Pond...	725	E Meadow P'nd	4.3	Massa'qua, west	708	773	Millburn.....	4.1
E Meadow P'nd	509	E Meadow P'nd	287	Wantagh Pond	825	Wantagh Pond	4.1	Newbridge...	849	873	Hempstead.,..	3.0
Millburn Pond.	532	Mass'qua Pond	357	Smith's Pond..	875	Mass'qua Pond	3.7	Wantagh, east.	879	424	Clear Stream ..	2.5
Mass'qua Pond	567	DeMott's Pond	371	Millburn Pond.	1125	Millburn Pond	2.7	East Meadow..	920	886	Valley Str. Res.	2.4
Hemp. Sto. Res.	630	Millburn Pond.	411	Newb'dge Pond	1141	Schodack Brook	2.4	Valley Str. Res	921	377	Wantagh, east.	2.1
Schodack Brook	812	Schodack Brook	571	E Meadow P'nd	1250	Tanglew'd P'nd	2.2	Massa'qua, west	956	773	Springfield ...	1.96
Smith's Pond .	846	Tangle'wd P'nd	838	Sp'field Over'fl	1311	DeMott's Pond	1.3	Clear Str., east.	1200	1940	Twin.........	1.80
Pine's Pond ..	879	Smith's Pond..	891	Mass'qua Pond	1320	Smith's Pond..	1.0	Millburn.....	2021	490	Pine's	1.80
Tanglew'd P'nd	1133	Pine's Pond ...	939	Valley Str. Res	1325	Valley Str. Res	.92	Pine's........	2131	1154	Smith's, east...	1.50
Valley Str. Res.	1441	Valley Str. Res.	1513	Schodack Brook	1400	Clear Str. Pond	.90	Springfield ...	2813	1450	Tanglewood...	1.40
Baiseley's Pond	1841	Baiseley's Pond	2365	Twin Pond...	1619	Pine's Pond...	.80	Smith's, west.	2967	621	Wantagh, west.	1.25
Clear Str. Pond	2654	Clear Str. Pond	2816	Hemp. Pond..	1829	Sp'field Pond..	.34	Tanglewood...	3039	2155	Massa'qua, east	1.20
Twin Pond ..	5979	Springfield P S	3820	Tanglew'd P'nd	1913	Twin Pond....	.27	Twin........	3450	1875	East Meadow.	1.04
		Twin Pond ..	7791	Clear Str. Pond	2353	Baiseley's Pond	.26	Hempstead Res	4490	1502	Newbridge....	.97
								Clear Str., west	5488	2206	Massa'qua, west	.91
								Baiseley's.....	5560	800	Clear Stream .	.62

The western section gives averages all lying above 1,200 bacteria per C. C., and the order of increase from east to west is broken only by Baiseley's Pond, the most westerly in this section. Watt's and Springfield Ponds are omitted, because of irregularities in service.

It is evident that in general a definite and progressive increase in the number of bacteria occurs as the population on the drainage areas of the ponds increases, from Wantagh Pond on the new shed to Twin Ponds on the old shed.

The exceptions are thus accounted for. Massapequa Pond, although it has practically no population on its drainage area, receives from the swamps which lie above it, a larger amount of vegetable organic matter than any other pond on the water-shed, as shown by its color and its chemical constituents, especially during periods of heavy rain.

Hempstead Pond receives some at least of its supply from Hempstead Storage Reservoir, and thus represents a relatively populous drainage area. On the other hand, the chemical analyses show a remarkable diminution in the evidences of pollution in the pond, as compared with the reservoir. Baiseley's Pond, which drains one of the most populous areas, has presented a very large number of microscopical organisms, thus introducing a factor somewhat unusual on this shed, the relation of which to the bacterial counts is described beyond.

Considering now the relations between the averages obtained previous to the exceptionally heavy rain-fall of July (column 2), the western section yields results all above 1,200 bacteria per C. C., and presents the same order of increase in the averages as for the whole period (column 1). Springfield Pond, not considered in the previous list, is an exception to the rule of progressive increase towards the west, in being lower than Twin Ponds, although situated west of the latter.

Of the remaining ponds, the three whose averages rise above 600 bacteria per C. C., lose their strict comparability with the others, more or less, from the fact that one of them, supplying the other two, was in process of cleaning during part of this period.

The eastern ponds maintain the relation to each other shown in the previous list fairly well. A reversal is found in the relation of

Wantagh Pond to Newbridge Pond which, however, is of comparatively little significance, because their averages lie very close to each other in both periods. Massapequa and Millburn Ponds are also reversed in order. This change is of somewhat greater significance as is shown below. Hempstead Storage Reservoir gives an average which places it with the eastern section.

For the period of heavy rain-fall, the ponds arranged in the order of magnitude of their averages, show the following relations (column 3). On the eastern section these ponds follow the same order for this period that they did for the whole period (column 1), except that Millburn Pond stands lower than Newbridge Pond. The ponds of the central and western section do not hold the same order which obtained in the period previous to heavy rain-fall, (column 2), or in the whole period (column 1). Hempstead (De Mott's) Pond stands lowest on the scale, Baiseley's coming next. Valley Stream Reservoir, Twin Ponds, and Clear Pond are amongst the highest. Of the eastern section, East Meadow and Massapequa Ponds only rise about 1,200 bacteria per C.C., Schodack Brook, Hempstead Pond, and Tanglewood Pond in the central section and all the supplies of the western section, except Baiseley's Pond, also show more than 1,200 bacteria per C. C. The low average on Baiseley's Pond is in part due to the presence of the very large number of microscopical organisms there found. The significance of these changes will appear by reference to the list (column 4) which gives the ratios of the averages during the heavy rain-fall, to the averages on the same ponds for the period preceding the rain-fall. It will be seen that all the ponds east of Smith's Pond, except Pine's Pond, show averages distinctly higher during the heavy rain-fall than during the previous period. The ponds west of Smith's Pond show, on the other hand, a decrease, the order of the decrease following more or less closely the order from east to west. Smith's Pond itself shows no change.

The explanation offered for these relations is as follows :

Two principal factors are recognized as affecting bacterial counts obtained on surface waters. The first is the amount of rain-fall, the second is the amount of organic matter present fit for bacterial food.

A heavy rain-fall acts in part mechanically, stirring up the pre-

viously quiescent surface waters and washing into them bacteria from the surrounding soil ; in low-lying regions by washing in also stagnant waters in which bacteria were previously present in large numbers. Heavy rain, also, however, affects bacterial counts by washing into the surface waters increased quantities of organic matter, which furnish the bacteria already present, as well as those introduced by the rain-fall itself, an increased quantity of food.

The mechanical action of rain on any given supply is continued beyond the time at which precipitation ceases. The volume of water deposited on the drainage area during a rain takes some time to escape into the supply, and during the period which elapses from the beginning of the rain-fall until the usual conditions of drainage and rate of flow are re-established, the supply is subjected to more or less unusual agitation. This mechanical effect of rain-fall is seen best in rivers, and increases, other things being equal, with the extent of drainage area. On the small streams and ponds of the Brooklyn water-shed, the effect even of heavy precipitation is not lasting. The water soon disappears from their small drainage areas, part of it running off into the supplies and part of it passing directly into the porous soil of the water-shed, reaching the supplies, if at all, by percolation.

The second effect of rain-fall, that of furnishing an increased supply of bacterial food, depends more on the nature of the drainage area than on its extent. A drainage area, rich in organic matter, will naturally yield more to its water-courses, during a heavy rain, than will a drainage area similar in all respects, except in that its organic matter is less abundant.

Accepting these propositions, it becomes evident that the relation of the averages obtained on the water-shed, under discussion, before the heavy rains to the averages obtained during the heavy rains, must be interpreted with due regard to the conditions existent on the drainage areas of the various supplies. The ponds which show definite increases as the result of rain-fall, are the ponds which have drainage areas rich in organic matter, but organic matter which does not reach the ponds in a form suitable for bacterial food under usual meteorological conditions. This is particularly true of the eastern ponds, which drain areas where vegetable organic matter is very abundant, but ordinarily undergoes decomposition in the

swamps where it lies, showing comparatively little evidence of reaching the water of the ponds. A heavy rain-fall washes this matter in quantities into the supply and an increase in bacteria results.

The ponds which show definite decrease in bacteria, on the other hand, are, as a rule, those which drain more or less populous districts. In such districts, the organic matter is derived largely from comparatively well drained but polluted areas. The organic matter is not stored up as it is in the uninhabited districts, but has free access to the water supplies at all times. The effect of this constant drainage is well shown in the high counts obtained from such ponds in fair weather, as compared with the low counts of the unpolluted ponds under similar conditions. In periods of heavy rain-fall when uninhabited areas, without artificial drainage, are being flushed out into their water-courses, the populous areas also, without doubt, contribute an increased amount of organic matter to their streams. But the organic matter reaching the first class of ponds is the accumulation of time, and is abundant in amount. The organic matter reaching the second class of ponds has been prevented from accumulating to anything like the same extent, and the reserve stock, so to speak, is small. A heavy rain-fall, therefore, soon exhausts the amount of organic matter, which can be readily washed into the supplies, and because the pollution of these populated districts is a factor subject to little variation, the subsequent precipitation increases the volume of the water reaching the supplies without proportionately increasing its organic contents. In other words, an actual dilution occurs. The absolute amount of organic matter is undoubtedly increased ; but in relation to the amount of water it is decreased, and the bacteria decrease with it. The albuminoid ammonia determinations, covering the period immediately preceding and during the heavy rains, support the hypothesis above advanced, in so far as they show a great increase on the eastern ponds due to the rains, followed by a relatively gradual diminution ; whereas the western ponds show in general a proportionately smaller increase due to the rain, and a very considerable diminution immediately following.

The general proposition, then, that on this water-shed and during the progress of this investigation, a rise in bacterial counts during

heavy rain-fall is dependent, principally, upon the presence of swampy areas contributing to the supplies, a fall under similar conditions to areas well drained and populated holds true. Newbridge, East Meadow and Wantagh Ponds are the best examples of the former conditions, Twin Ponds of the latter.

Massapequa Pond presents, perhaps, the greatest amount of swampy land with the smallest population on the shed. But the nature of the swamp allows, even during fair weather, a somewhat high amount of organic matter to reach the supply, as shown by its relatively high counts during fair weather when compared with the counts on the other eastern ponds.

Hempstead Storage Reservoir, on the other hand, presents one of the most polluted drainage areas on the shed. The analytical results, as a whole, however, show that in fair weather at least a considerable amount of self-purification and dilution of the polluted water reaching it through its feeder obtains. In wet weather, on the other hand, not only is this pollution somewhat increased, but the swamp lands at the head of the reservoir also contribute more or less organic matter in excess of the usual amounts. Further, it must also be remembered that this is the largest body of water on the shed; that the small amounts withdrawn from it in proportion to its capacity reduces the rate of flow through it far below the rates obtaining on the smaller supplies, giving greater chance for sedimentation in good weather, and that these very factors allow rain-fall to show exaggerated mechanical effects.

The remaining ponds show ratios intermediate between those of the eastern ponds and those of the western ponds.

The relation of the ratios to what may be called potential pollution from swamp lands and actual pollution from inhabited districts is closely consonant with the actual conditions.

The ratio obtained on Pine's Pond is probably lower than it would have been had not the counts of the fair weather period been raised by the cleaning of the pond during part of that period. The same statement holds with regard to Tanglewood and Smith's Ponds, and to some extent with regard to Valley Stream Reservoir; the two former receiving the waste from Pine's Pond, the latter having been itself in process of cleaning during the earlier months of observation.

The columns 5 and 6 show side by side the averages of parallel counts obtained at the inlets and outlets of the ponds during a portion of the period of observation. The period during which these parallel counts were obtained was limited and included parts both of the fair weather and bad weather periods, as shown in detail in the tables of Part II., thus accounting for the somewhat high averages given. Column 7 gives the ratio existent between each inlet and its corresponding outlet for this period.

These ratios show, under the limitations imposed by the particular circumstances of each case, the relative effect of each feeder upon the water of the pond it supplies. In those cases where a pond is supplied by a single feeder the problem of determining the effect of that feeder on the pond is comparatively simple, and is treated therefore first.

The relations obtaining between the inlets and outlets at Newbridge Pond and East Meadow Pond show that but small change in the bacterial contents from a quantitative standpoint takes place.

The other ponds supplied by a single feeder show a more or less marked diminution in the counts at the outlet as compared with those at the inlet, the differences increasing in the order, Tanglewood Pond, Pine's and Twin ponds, Springfield Pond, Valley Stream Reservoir, Hempstead Storage Reservoir, Millburn and Baiseley's ponds. The factors entering into this diminution are principally sedimentation, occurring during the passage of the water from the inlet to the outlet, and diminution in food supply due to its exhaustion by the activities of the bacteria themselves, and to the natural chemical oxidation of the organic matter, which probably goes on to some extent, even independently of bacteria, in the presence of light and air. Further, the porous nature of the soil of the water-shed permits the entrance to the ponds of a more or less constant amount of ground water, derived by percolation, which is free from bacteria, and which does not apparently itself contribute largely to the supply of bacterial food suitable for the forms whose numbers are estimated by the methods employed, thus producing a certain amount of dilution.

Of these factors, sedimentation and exhaustion of food are the most prominent.

Sedimentation plays, perhaps, the most important part at Hempstead Storage Reservoir, although exhaustion of food and dilution are also prominent. At Baiseley's Pond the exhaustion of food is probably the controlling factor, the very high albuminoid ammonia at the outlet being due to the large amounts of living microscopical organisms there found.

In the remaining ponds the controlling factor cannot be so readily picked out; but it would appear in general that the richer the supply of food at the inlet the higher the bacterial counts there obtained and the greater the diminution at the outlet. That this general rule shows many variations is not strange when the factors of sedimentation and dilution varying on each pond are taken into consideration also.

Of those ponds which are supplied by two feeders, Clear Stream presents most typically the difficulty in judging from a comparison of the figures obtained at the inlets with those at the outlet, the amount of pollution which each feeder contributes to the pond. Here the relation of the averages on the feeders to each other furnishes the best evidence and shows a remarkable agreement with the physical conditions of their respective drainage areas.

The whole problem requires a much more exhaustive examination than has been possible under the conditions of this investigation, and nothing more than a mere outline of the subject has been attempted.

The discussion of the relative purity of these supplies, as indicated by the bacterial counts, would be incomplete without some reference to the question of the establishment of a bacterial "standard of purity." The difficulties which lie in the way of determining any fixed standards applicable for all waters and at all times is discussed elsewhere. The attempt has been made by Miquel; but the factors influencing the results in any given examination are so numerous that it has been found just as impossible to judge the character of a water from a single bacterial examination as it would be to do the like from a single chemical determination.

For a limited section of country it might be possible to determine roughly the reasonable limits within which the counts might vary without indicating unsanitary conditions; but, even so, the meteorological and other factors influencing the supply at the time

of each examination would require consideration, and to such limits liberal interpretation in specific cases must be granted.

If, however, an extended investigation be made covering a sufficient length of time to eliminate the exaggerated effects of temporary and unusual conditions, the general run of the counts obtained is, without doubt, a very strong indication of relative purity when properly interpreted. On this water-shed the relations of numbers of bacteria per C. C. to purity is fairly definite.

A table illustrating these points is given below.

Column 1		Column 2		Column 3		Column 4	
Source.	Highest Count	Source.	Percentage of counts under 500	Source.	Percentage of counts under 1000	Source.	No. of positive Colon B reactions
Wantagh Pond	1600	DeMott's Pond	88.2	Newb'dge Pond	100.	Wantagh Pond	0
E. Meadow P'nd	2100	Newb'dge Pond	80.6	DeMott's Pond	94.4	DeMott's Pond	0
Mass'qua Pond	2500	Wantagh P'nd	78.8	Hemp. Sto. Res	93.9	Schodack Brook	0
DeMott's Pond	3000	Hemp. Sto Res.	75.8	Wantagh Pond	90.9	Smith's Pond	0
Millburn Pond.	3000	Mass'qua Pond	74.2	Mass'qua Pond	90.3	Mass'qua Pond	1
Newb'dge Pond	3600	Millburn Pond.	73.9	Millburn Pond.	89.1	Newb'dge P'nd	1
Schodack Brook	3600	E. Meadow P'nd	67.6	E. Meadow P'nd	88.2	Millburn Pond	1
Pine's Pond ..	5500	Schodack Brook	61.5	Pine's Pond. .	82.4	Hemp. Res	1
Smith's Pond	7000	Smith's Pond. .	55.9	Tanglew'd P'nd	82.1	Pine's Pond. . .	1
Valley Str. Res.	8000	Tangle'wd P'nd	53.6	Schodack Brook	80.8	Tanglew'd P'nd	1
Hemp. Sto. Res.	10000	Valley Str. Res.	48.4	Smith's Pond. .	79.4	Valley Str. Res	1
Tanglew'd P'nd	11000	Pine's Pond . . .	44.1	Valley Str. Res	64.5	Sp'field Pond. .	1
Clear Str. Pond	13400	Baiseley's Pond	34.4	Twin Pond ..	48.4	Baiseley's Pond	1
Sp'field Pond. .	14200	Clear Str Pond	16.7	Baiseley's P'nd	46.9	E. Meadow P'nd	3
Baiseley's Pond	17000	Sp'field Pond. .	16.7	Sp'field Pond.	41.7	Clear Str. Pond	3
Twin Pond ..	48700	Twin Pond	16.1	Clear Str. Pond	26.7	Twin Pond. . . .	5
						Ridgew'd Res.	1

In column 1 the ponds are arranged in the order of the magnitude of the highest counts obtained on each for the whole period ; it will be seen that the grouping agrees well with that division of the shed as regards purity, which is based on the whole evidence obtainable from sources other than bacteriological.

It is reasonable to conclude, then, that for any of these supplies the limit to which the counts may rise, is dependent to some extent upon their relative purity; and that probably the "highest count" is some indication of the existing *possibilities* of pollution.

The evidence derived from the "highest counts" while it does agree in general terms with other known conditions, is necessarily based on a single determination. It is true, however, that the next lower counts of each supply support similar conclusion. Nevertheless, in deciding the relation of the supplies to each other on the basis of the magnitude of the counts obtained, more reliable evidence is yielded by the percentage of counts below certain arbitrarily chosen figures which each supply shows. These percentages are listed in columns 2 and 3. It would appear that when seventy-five per cent of the bacterial counts are below five hundred bacteria per C. C., or ninety per cent. are below one thousand bacteria per C. C., the supplies may be considered in a fairly satisfactory sanitary condition. Of course, in dealing with these results, as with all other analytical results, unusual local and temporary conditions, modifying the results from any one supply, must be taken into account. To sum up the conclusions as to the sanitary significance of the bacterial results on these waters, the following outline of the principles upon which the interpretation has been conducted may be of use. It is not intended that the principles should be considered as applicable to all waters in every part of the country, but it is hoped that they may form a basis for future investigation on the same lines.

1. The average count for a prolonged period yields evidence bearing on the amount of organic matter present during that period. The higher the average count, the greater the quantity of organic matter present and the more probable the derivation of the organic matter from animal rather than from vegetable sources.

2. The highest count obtained in a series on any one supply points to the relative limit of possible pollution from organic matter during the period covered, although such results must be accepted with caution.

3. The proportion of high counts to the whole number obtained

on a given supply yields evidence as to the constancy of pollution from organic matter.

4. A low average count during average fair weather periods, followed by a relatively high count during heavy rains, points to potential rather than actual pollution of the supply from organic matter.

5. A high average count during average fair weather, points to actual pollution from organic matter, and if the average count is less during heavy rains, it may be concluded that the pollution obtaining during fair weather represents most of the possible pollution of the supply, and that during heavy rain, dilution of the impurities takes place.

6. The relation of the average count on the inlet of a supply to the average on the outlet is some indication of the locality of origin of the organic matter, and of the amount of self-purification which may take place in the supply between the points of examination.

7. A given amount of nitrogen as estimated by the albuminoid ammonia determination, derived from animal sources (sewage, drainage of stables etc.), corresponds with a very much higher bacterial average, than an equivalent or much greater amount of nitrogen estimated by the same method, derived from vegetable sources. Hence the source of the nitrogen of the albuminoid ammonia determination may be approximately fixed by a consideration of the parallel bacterial counts in many cases.

The treatment of these results from the standpoint of averages is natural in reviewing the work of this investigation, but should not be considered as indicating that single examinations are of no value. It is true that the fluctuations in the counts obtained from any one source are wide. Nevertheless, an inspection of the counts obtained during any one week from the different supplies of the shed, does allow conclusions in general harmony with those deduced from the whole evidence accumulated during the whole period.

The bacterial quantitative results on this water-shed, as a whole, furnish one of the most definite indications of relative pollution which is presented by this investigation, and this is true, notwithstanding the fact that the explanation of the relation of bacterial counts to pollution is not yet on a wholly satisfactory basis.

It must be confessed that the value of bacterial quantitative examinations on public water supplies, by ordinary methods at least, has of late years been somewhat disregarded. The problem was approached during this investigation, therefore, with some doubts as to its ultimate practical value, and with every effort to secure the greatest possible uniformity of methods, and working precision, in order that the sources of error dependent upon the technique should be ruled out as far as might be. It is believed that the results obtained justify the statement that bacterial quantitative analyses carefully interpreted lead the investigator to very much the same final conclusions, with regard to this water-shed at least, as the other and longer established methods of analysis more widely accepted for sanitary investigations. The fact that the figures obtained cannot be compared with an arbitrary standard, and definite conclusions be immediately based on their relation to that standard, is no more a reason that the information to be obtained from them should be disregarded, than that a like course should be pursued with the results of chemical or microscopical examinations.

The relation of variations in bacterial results on public water supplies to variations in chemical results at the same time and place, and to the results of microscopical examinations, promises a most interesting field for future work. Certain relations of this nature were evident in this investigation and are touched upon elsewhere. The time at our disposal has been limited, and only a very general treatment of the subject has been attempted.

The determination of the species of the bacteria found, other than those associated with sewage pollution, has not been attempted for the following reasons :

The significance of most of the ordinary species found in water in relation to the characters of the waters containing them has not been worked out up to the present time, and, therefore, determinations of such species would be of little practical value. It is true that pathogenic spirilla have been isolated from the Schuylkill River at Philadelphia[1]; but it is yet to be demonstrated that their pathogenic properties affect the health of the consumer. The in-

1. Jour. Exp. Med. i., 1896—A. C. Abbott, M. D., and Jour. Exp. Med., Sept., '97,—A. C. Abbott, M. D., and D. H. Bergey, M. D.

vestigations devoted to the determination of the anærobic organisms connected with putrefactive processes[1] were not made public sufficiently early to be utilized in this work. Both of these points deserve attention in the near future.

The work of determining new bacterial species cannot be done rapidly, with the slightest hope of establishing the results on a basis worthy of lasting recognition,[2] and it was considered more advisable to devote the available time to subjects which could be brought more nearly to completion. To any one familiar with the present chaotic condition of species work, especially as regards water forms, there is no attraction in opportunities for species work which do not allow of exhaustive study. It was early seen that any species work here attempted must, necessarily meet with many interruptions, and that within the time allotted, little could be contributed to the subject in general that would not add to the confusion in names and characters already existent. Bacterial forms, apparently giving characteristics not heretofore described, may be found in abundance by any investigator who chooses to devote himself to the task, but the investigator who wishes to establish a single form as a new and constant species, or even as a new and constant variety of any known species, must devote time and work to that subject which will usually prevent his giving much attention to any other. Again, if one such new species were firmly established by elaborate and careful work, an almost equally large amount of work must be done in order to identify with it any form apparently similar, subsequently isolated. The description of new species, and the identification of forms with species previously recognized, is work lost unless it is done with an elaboration of detail, which, under existing circumstances here, was impossible.

The determination of the colon bacillus stands upon a different footing. The elaborate work of Dr. Theobald Smith has made the recognition of this species and its near allies comparatively simple. The methods devised by him are readily applied in practice, and the results obtained are of practical significance.

---

1. "The Value of a Bacteriological Examination of Water"—E. K. Dunham, Jour. Am. Chem. Soc., Aug., '97.

2. Jour. Am. Pub. Health Assn., Oct., '95.

During the period of observation here, two hundred and four examinations for intestinal bacteria were made, yielding twenty-one positive reactions. In other words, the colon bacillus was found in about ten per cent. of the examinations made. These twenty-one positive results were distributed as shown in the preceding table, and confirm still further the general conclusions previously arrived at. This bacillus is derived from feces. When found frequently in a supply, direct sewage pollution may be inferred.

The isolation of the typhoid bacillus from water is a problem presenting, at the present time, so many difficulties and so much uncertainty that it was not considered advisable to attempt it.

MICROSCOPICAL.

A table showing in brief certain of the principal features of the microscopical work is appended, and is largely self-explanatory :

AVERAGES OF MICROSCOPICAL ORGANISMS

(No. per c c.)

COLUMN 1.		COLUMN 2.		COLUMN 3.		COLUMN 4.		AVERAGE GENERA.		TOTAL GENERA.	
Source.	Jan. to Oct.	Source.	Jan. to June.	Source.	July to Sept.	Source.	Ratio of col. 3 to col. 2.	Source.	Jan. to Oct.	Source.	Jan. to Oct.
PONDS.		PONDS.		PONDS.		PONDS.		PONDS		PONDS.	
Newbridge	11	Wantagh .	6	E. M'dow.	7	Springfield	15.1	Newbridge	4	E. M'dow.	22
Schodack .	14	Newbridge	10	Newbridge	10	Wantagh . .	6.0	Wantagh . .	5	Newbridge	28
Wantagh . .	16	Schodack .	10	Tanglew'd	11	Hemp. Rsr.	2.4	E. Meadow	5	Schodack .	29
E. M'dow.	16	Twin	20	V. S. Rsvr.	11	Twin	2.3	Millburn . .	5	V. S. Rsvr.	29
V. S. Rsvr.	22	E. M'dow.	23	Millburn . .	15	Schodack . .	2.2	Tanglew'd	5	Twin	31
Millburn . .	24	Millburn . .	23	Cl. Stream	17	Baiseley's . .	1.8	V. S. Rsr. .	5	Tanglew'd	33
Twin	29	Mass	27	Schodack .	22	Massa'qua.	1.8	Massa'qua.	6	Smith's . .	33
Cl. Stream	31	V. S. Rsvr.	29	Smith's . . .	23	Newbridge	1.0	Schodack . .	6	Cl. Stream	33
Mass	35	Cl. Stream	37	Pine's	29	De Mott's.	.77	De Mott's.	6	Wantagh .	36
DeMott's .	45	Springfield	46	Wantagh . .	30	Millburn . .	.64	Cl. Stream.	6	Springfield	36
Tanglew'd	58	DeMott's .	49	DeMott's .	38	Cl. Stream.	.46	Twin . . .	6	Millburn . .	37
Smith's . . .	66	Smith's . . .	93	Twin	46	V. S. Rsr. .	.37	Smith's . . .	7	DeMott's .	40
Pine's	225	Tanglew'd	97	Mass	48	E. Meadow	.30	Pine's	8	Mass	42
Hemp. Rsr.	362	Hemp. Rsr.	224	Hemp. Rsr.	464	Smith's . . .	.24	Springfield	8	Pine's	43
Baiseley's .	3173	Pine's . . .	370	Springfield	717	Tanglew'd.	.11	Baisley's . .	10	Baiseley's .	43
		Baiseley's .	2449	Baiseley's .	4384	Pine's	.08	Hemp. Rsr.	11	Hemp. Rsr.	57
								Spgfd. ovfl.	15		

It will readily be seen that microscopical organisms were found in abundance at but few points on the water-shed—*i. e.*, Hempstead Storage Reservoir, Pine's, Tanglewood, Smith's and Baiseley's Ponds. The comparatively large numbers found at these points

are due to the presence of food suitable for the microscopical organisms in unusual amounts, especially at Hempstead Storage Reservoir and Baiseley's Pond. The feeders of these two supplies bring to them large quantities of nitrates, while, moreover, both of these supplies are drawn upon for use to a very limited extent, and it is a matter of observation that under such circumstances the organisms increase.

The other three ponds are affected, principally, by the cleaning of one of them (Pines Pond) supplying the other two.

Springfield Pond illustrates the correspondence of lessened use to increased microscopical growths very well. Previous to the rains the average obtained was low. For the subsequent period the count increased more proportionately than at any other place. These two periods, however, correspond, the first with active service of the pond, the second with the cutting of the pond out of the supply.

The effect of the rain-fall, as shown by the ratios in column four, varies on different ponds, but evidently the seasonal diminution usually characteristic of the midsummer months, is obscured by this factor.

The relation of microscopical organisms to the odor and taste of the water has not been prominent on the water-shed, except in the case of Baiseley's Pond, and for a short period at Springfield Pond, described in detail under each in the Synopsis.

During the earlier spring and summer months, Asterionella was very prominent in certain basins of the Ridgewood Reservoir, as shown in detail in the tables of Part II. During the summer months this organism, as well as the other forms found previously in abundance, diminished very much. While it is true that Diatoms usually are lower in number at this season of the year than in the earlier months, and that Asterionella in particular usually flourishes best in the spring and fall,* yet the exaggerated differences here observed show a relation to the heavy rains which cannot be misunderstood, and is probably dependent, to some extent, at least, on the increased volume of water reaching and passing through the Reservoir. The odor observed in the water from the

* "Seasonal Distribution of Microscopical Organisms"—Gary N. Calkins, Report Mass. State Board of Health, 1892.

taps during the spring months was aromatic and fishy, characteristic of Asterionella. During the heavy rains this odor practically disappeared, in marked contrast to the conditions described as having been observed during the corresponding period of 1896, and previous to the commencement of the investigation carried on by this Laboratory.

A report of an investigation, carried on by the Department of Health, submitted in the early part of September, 1896, and made public under date of September 9th, 1896, ascribes the odors then existent in the water as it reached the consumer, to "living and decomposing vegetable material in the ponds, reservoirs and distribution systems." Attention was especially directed to vegetable matter in the sources of supply and to the presence of Asterionella in the Reservoir. Subsequent changes in meteorological conditions and the cleaning of several of the ponds during the winter months changed the whole complexion of affairs within a short time after this report was made. The investigations carried on, therefore, during the winter of 1896-1897 cannot be considered as bearing on the condition of the water supply during the previous summer, nor can the results obtained during the summer of 1897 be considered as applicable to the conditions of the summer of 1896, when the very marked differences in the meteorological conditions are taken into account. The summer of 1896 was exceptionally hot and dry, the water of the supply ponds was low and every opportunity for the conditions described as found at that time existed. The summer of 1897 was characterized by exceptionally heavy rains and lower temperature, while the water of the supplies was high.

It may be added that vegetable odors derived from dissolved vegetable matter, as distinguished from microscopical organisms, has been a feature of the waters of the supplies during this investigation, and that it is not improbable that a return of the extreme conditions of the summer of 1896 may produce in the future an exaggeration of these odors, even if the Asterionella growth in the Reservoirs diminish or disappear.

In connection with the question of the relation of odors to the presence of vegetable organisms of other than microscopical size, an investigation was carried out by this Laboratory during the latter part of the summer of 1897, directed to the identification of the

larger aquatic plants existing in the ponds and streams of this supply, and to the determination of any relation which they might have to the odors of the water, as a result of their life processes in distinction to the odors derived from their decomposition. Owing to the fact that the meteorological conditions did not favor the excessive growth of these larger forms, nor give opportunity for the development of special relations of their odors to the water, this investigation did not yield any striking results.

Various members of the families Cyperaceæ, Naiadaceæ, Typhaceæ, Nymphaeaceæ, Eriocaulaceæ, Cruciferæ, Lemnaceæ and Haloragidaceæ were found in abundance. A variety of Utricularia was especially plentiful in Smith's Pond. All of the eastern ponds, except Massapequa, and some of the central and western ponds showed the presence of a species of Myriophyllum (water-milfoil), the only form of the larger aquatic plants identified with which a distinctive disagreeable odor was associated.

This plant was found growing attached to the bottom of the ponds, sometimes reaching the surface in shallow places. It consists of a central stem with very numerous filamentous leaves, verticellate or alternately arranged. When freshly gathered the whole plant yields a very strongly marked fishy odor. Thoroughly washed to remove any adherent material to which the odor might be ascribed, no difference in the quality or degree of the odor was detected. The dried plant still retained its fishy odor, although in less degree. While the conditions were unfavorable to the full study of this plant in relation to odor, it is not impossible that if present in sufficient amount it may affect the water in which it is growing disagreeably.

The water-shed presents many of the microscopical organisms known to be capable of producing at times odors or tastes of a disagreeable nature, and these are shown in a table in Part II. A list of organisms which have been associated with such odors by various investigations is here quoted from an article of recent issue* dealing with the subject.

---

* On Odors and Tastes in Surface Waters.—D. D. Jackson and J. W. Ellms. Technology Quarterly, vol. x., December, 1897.

ORGANISMS.	NATURAL ODOR.	ODOR OF DECAY.
Diatomaceæ		
Asterionella	aromatic	
Tabellaria	aromatic	
Meridion	aromatic	
Cyanophyceæ		
Anabæna	moldy, grassy	pig-pen
Rivularia	moldy, grassy	pig-pen
Clathrocystis	sweet, grassy	pig-pen
Cœlosphærium	sweet, grassy	pig-pen
Aphanizomenon	faintly grassy	pig-pen
Chlorophyceæ		
Volvox	fishy	
Eudorina	faintly fishy	
Pandorina	faintly fishy	
Infusoria		
Uroglena	fishy and oily	
Synura	like ripe cucumbers	
Peridinium	fishy; like clam shells	
Dinobryon	fishy; like rock weed	
Cryptomonas	like candied violets	
Mallomonas	fishy	
Bursaria	Irish moss or salt marsh	

The general relation of bacteria to microscopical organisms is not clear from the results of the investigations carried out by this laboratory. The observations have not been of sufficient extent, and the meteorological conditions have been unusual during their progress. There appears to be generally some tendency to an inverse proportion between the counts of the total organisms and the numbers of bacteria per C. C. While it is true that the presence of decaying vegetable matter increases the number of bacteria somewhat, living microscopical vegetation appears to exercise some restraining action, although this statement is made with certain reservations.

A marked inverse relation obtains between the proportion of the bacteria to the micro-organisms at the inlets and outlets of certain ponds, and is usually accompanied by a change in the amount of nitrates, parallel with the change in the bacteria. The explanation offered is that the high nitrates of such inlets as those of Hempstead Storage Reservoir and Baiseley's Pond represent the result of the activities of the bacteria. The organic matter of these inlets is in a process of active change towards the mineral

form ; consequently, the bacteria are numerous. During the passage of the inlet water through the pond, the original organic matter of pollution becomes more or less completely converted into nitrates. The microscopical organisms, therefore, increase while the bacteria diminish from lack of food.

It is natural to suppose that such relations will be chiefly evident where the inlets are richest in matter fit for bacterial food and most capable of ultimate conversion into a form suitable for the microscopical organisms. Where such an inlet empties into a pond, the water of which is in slow movement, as is the case with Baiseley's Pond particularly, and with Hempstead Storage Reservoir to some extent, the changes are most marked. Where the flow through the pond is more rapid, the changes cannot advance to the same stage, and the relations become less definite. Time has not sufficed to trace the relation of particular species to bacteria ; the material for such investigations is presented in the tables of Part II.

DISCUSSION AND CLASSIFICATION

OF THE

SOURCES OF SUPPLY

It is self-evident that every public water supply should be sufficient in quantity to meet all the legitimate wants of consumers for domestic and manufacturing purposes, and for fire protection. But the quality of the water supply is as important as its quantity, since it directly affects its value for all these purposes except the last.

The first requisite of a water supply from the standpoint of quality is the absence of substances capable of producing disease. Unless this freedom is guaranteed, either by the purity of the source of supply or by purification of the water before it reaches the consumer, its use for domestic purposes constitutes a constant menace to the health of the community. But the quality of the supply may be objectionable on grounds other than that of its danger to health. Water perfectly free from the suspicion of carrying specific disease-producing constituents, may contain iron, lime or silt to such an extent as to render it unfit for certain domestic purposes or in the arts ; or it may present features of taste, odor or appearance, more objectionable from an æsthetic standpoint than from any other. An ideal water for public consumption should, therefore, be free from substances injurious to health, and from those interfering with its use for domestic and manufacturing purposes. It should also be acceptable as regards appearance, odor and taste. The character of many public water supplies, especially those of the larger cities, falls short of this standard in one or more particulars. The determination of the extent of depreciation in quality, which may exist without involving actual danger, is a matter which requires extended investigation in case, and a careful consideration of the many factors entering into the problem.

The substances which water may contain, capable of producing disease, are one or two metals very rarely found, and the specific bacteria of certain diseases, most prominent of which in this country is the typhoid bacillus. If it were possible to detect this bacillus in water with ease and certainty, it would appear that the sanitary condition of a supply could be determined directly. But it is not possible to isolate and identify this organism from public water supplies at the present time. It is, however, closely associated with sewage, and evidences of the presence of sewage in a supply are also evidences of the possibility of the presence of the typhoid bacillus. Hence it is that the energies of the sanitarian are directed to the detection of the admission of sewage rather than to the presence of specific bacteria of disease. Furthermore, the detection of such specific bacteria would not necessarily demonstrate more than their presence at the time when they were found. The exact source from which they entered the supply would still be left in doubt, and the probability of their recurrence would be left undetermined. Even if it were possible to detect them readily, then, the examination for evidences of sewage in the supply would still be a matter of necessity, in order to trace them to their most probable source. It is well known that while the most carefully guarded supply may become infected through a rare combination of circumstances from the excreta of some isolated or sporadic case of typhoid fever, by far the most dangerous source is certainly the general sewage of a community, into which passes the excreta of many people, amongst whom cases of typhoid fever may develop at any time.

The detection of sewage in potable water is, therefore, the chief object of sanitary water analysis. But it is by no means always a simple task. If sewage can be seen directly emptying into a supply, the question of its admission is, of course, instantly settled. But sewage may, and usually does, reach public water supplies by sources not so readily determined, such as general surface and subsoil drainage from areas upon which sewage material has been deposited—the common practice in communities which have no sewerage system. In such cases the determination of the character and amount of sewage reaching the supply is effected by chemical and biological examinations of the supply itself, by which even slight

evidences of the admission of sewage can be detected. There is, however, no one substance typical of sewage alone as distinct from natural waters, the detection of which is, in itself, proof positive of the presence of sewage or of its derivatives. It is upon the amounts and the combinations in which certain substances are found, substances present both in natural waters and in sewage, that the evidence is based. These substances differ considerably in exact character and amount at different times, but they may be broadly classified as organic matter and mineral matter. An intimate knowledge of these various constituents, under their various forms, and of the changes they undergo, is necessary to the ready recognition of their significance. Again, sewage reaching a water supply does not maintain its original characters for any great length of time. The organic matter undergoes gradual transition to a mineralized form, in the presence of bacteria and of light and air. Solid particles may sediment out from it, and the bacteria originally introduced with the sewage tend also to sedimentation and to disappearance by death. The determination of the stage of decomposition which the organic matter may have reached, and the diminution in the number of bacteria found, indicate to some extent the degree of self-purification which the water, originally receiving direct sewage pollution, may have attained subsequently. At the same time the relation of these changes to the real diminution of danger to health, where the supply has been actually infected through sewage containing disease producing bacteria, is not as yet absolutely determined; so that recognized sanitary authorities have maintained that, in this respect at least, a water which receives sewage at any point cannot be thereafter considered absolutely free from danger. Nevertheless, it must be admitted that the greater the evidence of self-purification the smaller the chances of danger from the water may be considered.

In treating of the evidence of the presence of sewage or its derivatives in the Brooklyn supply, the following statements are submitted:

The term "sewage pollution" must be understood as covering all the conditions resulting from the admission to the supply of the "waste matters of human life and industry," as distinct from the products of vegetable decomposition, or of the other natural pro-

cesses found in uninhabited districts. In speaking of polluted water it is therefore the intention to convey the idea that the water has at some time come in contact with such "waste matters." Its classification as questionable or unsafe depends upon the evidence obtained of the amount of purification which it may have undergone since it was polluted. When the extent of such purification is considerable, and the original pollution is more or less remote, a water cannot be absolutely condemned, nor can unqualified indorsement of its use be accorded. It is plainly the duty of the sanitarian to point out as far as may be the actual condition of the supply and to give warning of the possible danger incurred in its use. Where the evidences of recent and extensive sewage pollution exist, it is as plainly the duty of the sanitarian to pronounce the supply a menace to health, and therefore unfit for public use. Sources of supply, showing no evidences of sewage pollution and not otherwise objectionable, must be approved.

As the result of detailed consideration of the analyses and inspections made during this investigation, elsewhere described in full, the following conclusions have been reached

The surface waters have been divided into five classes, on the basis of the relative pollution which they present :

SAFE	REASONABLY SAFE	QUESTIONABLE		UNSAFE
No evidence of Pollution	Very slight evidence of Pollution	Slight evidence of Pollution	Distinct evidence of Pollution	Decided evidence of pollution
Mass'qua Pond	E. Meadow P'd	Millburn Pond.	Hemp. Str. Res	Valley Str. Res.
Wantagh Pond	Hempstead	Schodack Brook	....	Watt's Pond...
Newb'dge Pond	(DeMott's) P'd	Pine's Pond....	....	Clear Str. Pond
....	....	TanglewoodP'd	....	Twin Ponds...
....	....	Smith's Pond..	....	....

Baiseley's and Springfield ponds are evidently polluted, but are not now in active service. Their condition is such that at no time should they be readmitted to the supply.

On the basis of the menace to health which these surface waters present, the unpolluted ponds must be classified as safe and perfectly fit for drinking purposes. The more or less polluted ponds are, in their present condition, open to suspicion. Those classified as having decided evidences of pollution constitute a menace to the health

of the city. Those in which the pollution is less evident are correspondingly less open to this objection. There is a border line between the condition of unsafe and merely questionable, and the attempt to set exact limits on such a matter is difficult. Hempstead Storage Reservoir lies on this border line. The pollution it receives from Horse Brook is evident, but the subsequent dilution and purification is extensive.

Hempstead Pond, on the other hand, judged from the analyses alone, shows but small traces of pollution, but opportunities for increased pollution by the admission of water from Hempstead Storage Reservoir always exist. East Meadow Pond also shows only very occasionally signs of the possibility of pollution which exists upon its feeder, and both of these ponds rest therefore on the border line between questionable and safe.

The unpolluted surface waters of the shed present no objectionable features unless a slight vegetable odor and taste and a brownish color, most marked during heavy rain-fall, be so considered. The characteristics usually disappear before the water reaches the consumer or are lost by dilution with other waters.

The more or less polluted supplies present objectionable features other than their menace to health. No consumer relishes the idea of drinking water which is known to receive the drainage of inhabited districts, of manured fields, stables, pig-pens, and the like, even though he could assure himself that no danger were involved in so doing. Some of these supplies also yield odors which are characterized as unpleasant, disagreeable or even offensive. It is true, however, that these odors are lessened, to a great extent, or even lost entirely, by subsequent dilution due to admixture with other waters in the general supply.

The driven wells of the shed contribute waters which have passed through the subsoil of the water-shed before they reach the general supply, and have, therefore, undergone more or less thorough filtration. The closer the texture of the subsoil through which they pass, and the longer they are in contact with it, the greater is the extent of the purification that they receive, other things being equal. Surface waters, which receive direct sewage pollution, and which subsequently percolate through the soil, may thus become completely free from organic matter in forms characteristic of sew-

age. Should the subsoil be very open, so that large interstices or fissures exist, or should channels be formed in the subsoil by the constant flow of ground water in one direction, this filtering action is partially lost, and, under such circumstances, a driven well may become a source of danger. This is particularly true of shallow wells.

It is probable that the driven wells of the Brooklyn supply are sunk in soil, which would guarantee the removal of the typhoid bacillus from polluted waters, should the latter obtain admission to the ground water by percolation from surface drainage. Nevertheless, this guarantee cannot be looked upon as absolute. Certain of the driven wells of the shed are situated in populous districts. Others are driven directly through the beds of streams formed by the overflow of surplus waters from polluted ponds. A consideration of these facts, with the evidence derived from the analytical work, justifies the division of the driven wells into two classes, safe and questionable. None of the driven wells, show such positive evidence of recent and direct sewage pollution that they can be classed as unsafe or directly menacing to health. The presence of sewage derivatives, which certain of the driven wells of the western section show, proves that their waters have been polluted previous to their passage through the soil. But that very passage is a safeguard against the admission of really injurious matter. Where no such evidences of provious sewage pollution exist, the driven-well supply may be declared perfectly safe. On this basis the following classification has been made :

Safe.		*Questionable.*		
Massapequa driven wells.		Jameco Park shallow wells.		
Wantagh	"	Baiseley's	"	
Newbridge	"	Spring Creek	"	(Old plant).
Merrick	"	Spring Creek	"	(New plant).
East Meadow	"			
Watts	"			
Clear Stream	"			
Forest Stream	"			

The deep wells at Jameco Park and Spring Creek furnish water of an inferior quality, but are probably safe, from a sanitary standpoint.

The general sanitary condition presented by the Brooklyn Water Supply is, therefore, as follows :

The relation of the amount of water derived from the polluted sources alone to the amount derived from the whole supply should be considered ; this relation cannot be fixed exactly, however, probably varying widely from time to time. A simple calculation based on the figures given in a Report of the Department of City Works, March, 1897, makes the proportion of surface water from "unsafe" sources about 6 or 7 per cent. of the whole supply. The surface water derived from questionable sources as based on the same figures, forms about 16 per cent. more. The water from questionable driven wells forms about 10 per cent. of the whole.

It would appear from these calculations that the really unsafe waters form a relatively small portion of the whole supply. But the percentages given above are based upon the supposition that all the driven-well plants of the new shed supply regularly at least four million gallons each, daily. It is self-evident that under conditions when it is impossible to use to the full the driven wells of the eastern section, on account of the insufficient pumping capacity at the Millburn Pumping Station, or for any other reason, the proportion of polluted and questionable water reaching the city is much larger. Far more important, however, than the actual amount of polluted water reaching the city, is the fact that some polluted water reaches the city constantly, and in that fact lies the chief menace. The serious infection of a single source would mean the infection of the whole supply, because of the intimate admixture of the waters from the different sources which exists in the distribution system. No part of the city would in such case be exempt from the *possibility* of infection except the limited area supplied directly from the driven wells of Gravesend and New Utrecht.

The *probability* of such infection occurring is another matter.

The Department of City Works has taken steps to provide against infection by panning the closets at certain points of special danger. The Department of Health has made every effort to detect cases of typhoid fever developing in the neighborhood of the supplies, and has in several instances found such cases, isolated

the patient and directed proper disinfection of the premises. It is due to the vigilance of these authorities in the face of much local opposition that the health of the City of Brooklyn has not yet been seriously threatened by occasional outbreaks of typhoid fever, in view of the unsanitary condition of a portion of the water-shed itself. Again, typhoid fever is not common in this part of Long Island, and the nature of the soil is in part a safeguard to the supply in so far as it absorbs polluting material to a considerable extent instead of allowing it to flow over its surface to the nearest water course. Yet the interests of nearly 1,200,000 people should not depend upon such partial and at best unsatisfactory safeguards. Typhoid fever cases cannot in the nature of things be discovered and isolated before they have developed, nor has the panning of closets been carried out at certain points, notably at Clear Stream. Twin Ponds, and Valley Stream Reservoir, which are particularly polluted. Moreover,this latter precaution is by no means absolute, even when carried out rigidly.

The problem of the cause of the odor in the Brooklyn Water Supply has received attention. During the progress of this investigation the odors, which were so prominent last year, have given rise to comparatively little complaint. The surface waters of the supply in general have yielded vegetable odors, due to decomposition of vegetable matter in the ponds and streams of the watershed. These have not been, however, sufficiently striking to be objectionable. During a part of the period of observation, large growths of Asterionella were obtained in Ridgewood Reservoir and the objectionable odor, taste and appearance of the Brooklyn water at such times was traced to this source. The large development of these growths in the Reservoir is due in part to the mixture there of ground and surface waters. This practically colorless mixture, exposed to light and air, is peculiarly favorable to such growths. Other factors, chief amongst which are meteorological conditions, not entirely understood, affect the growths also. The conclusion, is that while changes in the amount and character of the growths may be expected at different times, their recurrence at intervals with their accompanying odors is certain in the future, as long as the present physical conditions of the supply are unchanged.

Both the deep and shallow wells at the extreme western end of the water-shed furnish an inferior quality of water for domestic and manufacturing purposes, on account of the large amount of mineral matters which they contain. The fact that they are drawn upon very heavily at times, and thus render the whole supply of a much poorer character,is extremely unfortunate when the wells at the eastern end of the shed are able to supply a good quality of water if proper pumping facilities were provided at Millburn Pumping Station together with adequate pipe or conduit connections with Ridgewood Reservoir.

The problem of the present and future treatment which the Brooklyn Water Supply should receive is too large to be discussed in its entirety without a more extended investigation, and a more intimate knowledge of the engineering features of the question than are available at the present moment. From the sanitary standpoint, however, the following propositions obviously grow out of the conclusions already arrived at.

The statement that the health of the City of Brooklyn is menaced through the sanitary condition of a portion of her water-shed is fully justified by the foregoing report. With the interests of the large population involved,immediate steps to rectify these conditions are required; so much is obvious,

It would seem at first sight, a simple matter to cut out of the general supply those ponds which show decided pollution,to rectify the unsanitary conditions to which the ponds less polluted are subjected, and to take measures for the preservation of the whole supply on a sanitary basis. But the statement has frequently been made by the authorities concerned in maintaining the proper quantity of water, that the resources of the present supply cannot be used to the full on account of the lack of pumping and conduit capacity, and that if it could, the inadequacy of the whole of the present supply itself to meet the increased demands of the near future has become a problem requiring immediate solution.

Accepting these statements, then, it would appear that to place these polluted ponds out of service would cause serious embarrassment in the maintenance of a sufficient quantity of water for the city's needs. It has been admitted, however, that the present supply would meet all present demands and also those of the next few

years but for a considerable waste of water by the consumers. On the basis of a supply of 90,000,000 gallons daily, a conservative estimate, and a population of 1,200,000, a figure probably somewhat in excess of the actual number, the average daily supply *per capita* is 75 gallons, which is more than is usually considered necessary even in a manufacturing centre like Brooklyn. As long as this rate of consumption continues, however, the difficulty of maintaining a sufficient quantity must be met. The placing of meters throughout the city would probably reduce the *per capita* demand very materially. The expense of such a measure would be considerable.

An increase in the present supply, then, or, on the other hand a diminution in the present demand, would permit the shutting out of the polluted waters of the western section entirely. The amount of dangerously polluted water probably does not exceed ten or twelve million gallons daily, and it should not be impossible to effect readily an increase in the supply or a decrease in the demand to this extent.

Had the Millburn Reservoir been available for use the storage of surplus waters from the eastern section might have furnished a reserve which would have rendered the city more or less independent of the waters from the polluted western section, and it might appear advisable that this reservoir be rendered water-tight and placed in service immediately. It must be remembered, however, that the eastern section of the shed furnishes both surface and ground water. The attempt to store such water in an open reservoir, like that at Millburn, exposed freely to light and air, offers all the necessary conditions for the development of microscopical growths similar to those at Ridgewood Reservoir. This fact must be kept steadily in view, lest in attempting to provide for increased storage, provision be made also for the development of objectionable odor, taste and appearance in the water supplied to the city.

Recognized authorities state,* and the experience of other cities has shown, that additional facilities for direct pumpage within certain limits are cheaper than increased storage capacity, and when

---

* Report on Water Supply for the City of Philadelphia—Allen Hazen, 1896.

properly managed just as efficient in maintaining the quantity of a supply.

In view of the expense involved in making the reservoir water-tight in the first place, and the added cost of covering the reservoir to insure freedom from microscopical growths, it would appear that increased facilities at Millburn combined with adequate pipe line, or a conduit capacity to accommodate the increased supply, would be more satisfactory.

It is obvious that all these proposed measures for increase of the supply or diminution in the demand are matters which will take much time and thought to mature, and during this interval it is claimed that the use of water from the polluted sources already described must continue. If such be the case then the existing unsanitary conditions should receive immediate attention.

Sweeping reforms will alone place the polluted sources above suspicion. The more thoroughly these reforms are carried out the better. Certain cities have considered the value of a pure water supply of such paramount importance that the correction of unsanitary conditions has been carried to the extent of condemning and acquiring the property adjacent to the sources of supply and wiping out all existing causes of direct pollution entirely. Other cities have been content with providing for the sewering of populated districts situated on their water-shed areas.

It is a question whether the cost of such proceedings on the Brooklyn water-shed would be justified on account of the small quantity of water derived from decidedly polluted sources. The fact that these sources of supply are situated in districts cleared, drained and populated insures, moreover, a more or less gradual diminution in the quantity they furnish. Obviously, it would be better to abandon such supplies than to spend large sums in maintaining them in a sanitary condition. But if these supplies must be continued in service it is just as necessary that they be kept properly.

The changes above advocated are essential to a thorough reformation of the present unsanitary conditions. During the period while these reforms or their equivalents are being carried out, or failing their accomplishment for any reason, the actual menace

involved in the use of these supplies may be minimized more readily, although certainly less efficiently, by minor charges.

The present panned closet system existing in the vicinity of some of the supplies should be extended to all, without exception, and particularly to Twin Ponds and Valley Stream Reservoir.

The disagreeable features of pollution from manure, stables, pig-pens, etc., may be largely rectified by insistence on the observance of the regulations of the State Board of Health of New York, relating to such nuisances.

The careful supervision of typhoid fever on the water-shed, carried out by the present Commissioner of Health, should be extended, and the proper legal authority to deal with these cases, now lacking, should be accorded. Legislation requiring the regular reporting of typhoid fever cases on the water-shed to the local Boards of Health and the immediate transmission of such reports to the health authorities of Brooklyn should be secured. Facilities for the proper isolation of the patient and disinfection of the premises should be provided.

The diversion of Horse Brook now contemplated would transform Hempstead Storage Reservoir from a supply open to grave suspicion, as it is at present, to a supply of value.

The use of the shallow driven wells of the "questionable" class should be abandoned as early as circumstances will permit.

In addition to measures for the sanitary improvement of the shed, the cleaning of the ponds and reservoirs should be continued. Constant analytical supervision of the whole supply is necessary in order to detect future deterioration in those sources of supply now in good condition, as well in as those now more or less polluted.

The extension of the supply has been proposed, and if neither development of the present supply nor reduction in the present demand can be effected, will become a necessity. It is to be remembered that both the surface and ground waters of the shed are less abundant than formerly, on account of the constant drain upon them for the Brooklyn supply. Further, the villages situated on the water-shed have, many of them, instituted driven-well plants for their own use. As population on the water-shed increases, the demand for such local plants will also increase. There will be then even less water available for the City of Brooklyn

than there is at present. In the event of extension every care should be taken to provide that the new supplies shall be not only sufficient in quantity, but also of thoroughly good quality and free from pollution, and every effort should be made to maintain them in that condition.

Investigations have been made, from the engineering side of the question, to determine the quantity of water available toward the eastern end of Long Island; but little has been done to determine the quality of the water to be obtained. However, it is presumable similar in character to that found at the eastern end of the present water-shed, and may be equal to it in quality. This, however, is a matter for separate investigation.

The proposed new shed is at present sparsely settled. But the City of Brooklyn, which is so soon to become a part of Greater New York, has a population already estimated at 1,180,000, and is steadily growing larger. With increased facilities for transportation between New York proper and Brooklyn, which are sure to come in time, the increase of population is extremely difficult to estimate. The tendency toward suburban life about the large cities and the increase of rapid transit facilities is certain to cause the population of Brooklyn to extend eastward. Already the suburban population has pushed out twenty or twenty-five miles and large villages are numerous and growing on that section of the Island which forms the available water-shed for the Brooklyn supply. It is too self-evident to require statement that with increased population; increase of the water supply must necessarily follow. The extension of the present supply, then, while it provides for the necessities of the immediate future, is not a final solution of the problems of either the quantity or the sanitary quality of the water. There are two plans which offer themselves, in view of this situation, from a sanitary standpoint. Which of the two is chosen depends upon financial and engineering considerations, which it is not in the province of this report to discuss.

The first plan consists of purification of the present supply and, in the future, of the supply which may be obtained from the extension, by filtration. It must be remembered that extension of the supply does not mean simply the acquisition of new ponds and streams. The conduit capacity of the present system is now over-

taxed and cannot accommodate all the waters even of the present eastern section. The conducting of the water of the proposed extension to the city will mean new conduits or new pumping stations and force mains, or both. Moreover, there is a great opposition to the acquirement by the city of water rights in Suffolk County. While it is certainly preferable to obtain a supply so free from the possibility of pollution that it may be used with perfect safety, the growth of the population and the development of the whole country is so evident and so rapid that this becomes more difficult from year to year. The preservation of several hundred square miles of territory in an unpopulated condition, in order to preserve the purity of the supply of a large city, is a vast and costly undertaking. The evident alternative is purification of such supplies by filtration, which, in one or other of its forms, is the solution of this problem which will ultimately be adopted. The immediate demands of the present Brooklyn supply, as far as purification goes, is limited to the sources described as "unsafe" or "questionable." The filtration of these waters may be undertaken successively, beginning with those now showing decided pollution, and gradually developed with increasing needs, until the whole surface supply is thus treated. The construction of a by-pass about the Ridgewood Reservoir, now contemplated, and the increase of pumping facilities at the Ridgewood Pumping Station, would enable the filtered water to be delivered direct to the consumer without storage. If it be necessary to store the filtered waters, it will be also necessary that the reservoirs be covered, in order to prevent the development of microscopical growths. The cost of the extension, and the probability of its proving inadequate in time, makes this plan worthy of consideration.

The second plan consists in seeking some new supply on the mainland. Investigations of the Ramapo water-shed within the State of New York, and of Ten Mile River, a branch of the Housatonic, partially within the State limits, have been made and a report submitted by Messrs. William E. Worthen and Robert Van Buren, engineers in charge.

The foregoing propositions relating to the treatment of the supply as a whole, on a practical basis, may be summarized as follows :

1. Suspension of the use of the decidedly polluted ponds.

2. Abatement of nuisances and rectification of unsanitary conditions at all other points.

3. Preservation of the unpolluted sources of supply in their present sanitary condition.

4. Rigid sanitary supervision of the whole water-shed with special attention to typhoid fever.

5. Maintenance of the feeders, ponds and reservoirs of the supply in a condition free from rank vegetable growths.

6. For the prevention of microscopical growths, the covering of all reservoirs used for the storage of ground water, either alone or mixed with surface water; as an alternative, the direct pumpage of such waters to the consumers.

7. Proper engineering facilities for the development of the present supply and its extension eastward, to compensate for the abandonment of the polluted sources.

8. Filtration of a part or of the whole of the present supply.

9. The acquiring of an entirely new supply outside of the Island.

In view of the complicated problem presented by the present condition of the Brooklyn water supply, it is distinctly advisable that the question, as a whole, should be further investigated, not only on the sanitary side, but also on the engineering side, and that all the available evidence should be accumulated and placed in the hands of an independent expert, or committee of experts. A systematic, comprehensive and economical plan, based on this evidence, should be devised, which shall provide for the future as well as the present, which shall utilize to the full the plant and the supplies now in service, so far as may be, without detriment or danger to public interests, which shall call for only such additional supplies and such modifications of present conditions as may prove really essential and which shall so deal with the whole problem that the water supply of Brooklyn may ultimately be placed on a thoroughly efficient and satisfactory basis.

The City of Brooklyn will soon form a part of Greater New York, The new charter will give to its officials authority which will simplify, in many respects, the difficulties connected with this problem, and the complexion of the whole question will be more or less modified on the legal and financial sides.

But the sanitary and engineering problems will remain the same, and will demand as immediate and painstaking attention after consolidation is accomplished as they do at the present moment.

PART II.

ROUTINE OPERATION

OF THE

LABORATORY.

The situation of the laboratory in the centre of the shed has permitted the ready inspection of, and sample collection from, the several sources of supply.

A covered wagon with two horses made four trips each week to the three different sections of the water-shed and to Ridgewood Reservoir to collect the samples, covering between eighty and ninety miles in the four trips. The sources of supply were situated at such distances from each other and from the laboratory, as to allow of the samples reaching the laboratory within three or four hours of the time of collection.

After the arrival of the samples in the laboratory, which was rarely later than 1 P. M. each day, the analyses were immediately begun. The work was in such shape by the time the next day's samples arrived that the latter could immediately be handled as on the preceding day. By collecting samples only four days each week it was possible for one chemist to analyze thirty-five or forty chemical samples during the week. An equal number also of bacterial samples and of samples for microscopical examination could be examined by the biologist in the same time. The methodical system on which the whole routine was conducted permitted the analytical work to be thus covered by two analysts only.

The chemical work subsequent to July was carried out in more detail than during the previous period, and it was found that the additional determinations were made without additional help. It is a matter of regret that the chemical work previous to the reorganization in July was incomplete, but the then existing circumstances did not permit of its being otherwise.

In the collection of samples it was intended that each source of supply should be examined weekly. Chemical, microscopical and bacterial samples were to be taken at the same place and time each week in order to secure exact parallelism in conditions. The inlets of the surface supplies were to be examined at the same time as the outlets, and analyses at various points on the feeders were also to be made. It was found that the complications existent in the earlier part of the year prevented the carrying out of this program in full. Nevertheless, the results obtained represent fairly well the value of this method of procedure.

In order to allow of more easy handling, separate bottles were employed for the collection of the samples intended for each form of analysis.

Those for the chemical samples had a capacity of one gallon; those for the microscopical samples, a capacity of one quart. The bacterial sample bottles held about an ounce. All three were provided with ground glass mushroom stoppers. The chemical and microscopical bottles were prepared for use by the ordinary methods of cleaning and drying. The bacterial bottles were, in addition, sterilized, each in a separate covered tin case of its own, at a temperature of 200° C. for an hour and a half. An ordinary gas stove oven, such as is used for domestic purposes, was found to be more efficient for this work than the more elaborate dry-air sterilizers usually employed in bacterial laboratories.

The chemical and microscopical bottles were carried, each in separate wooden boxes, similar in design to those of Banker's patent.

The bacterial bottles, in their cases, were placed in a single large zinc-lined box, so planned that ice could be packed about the cases.

The technique of collection from surface water was somewhat simplified by the use of an apparatus described elsewhere,[1] which avoided the necessity of placing the hands in the water each time, a decided advantage in cold weather, and ensured the withdrawal and replacement of the stopper of the bottle at any depth desired.

The village of Rockville Centre, in which the laboratory was situated, is unprovided at present with gas for lighting purposes.

---

1 Journal American Pub. Health Ass'n. Proceedings of Philadelphia, Meeting 1897.

It was necessary, therefore, to install a gasoline plant for the use of the laboratory. A reservoir capable of holding three barrels of gasoline was sunk in the ground at the back of the laboratory building, and a Tirrill gas machine was placed in the cellar. The latter was operated by a water motor. This arrangement was found quite satisfactory.

The analytical results obtained were recorded in the books of the laboratory. Copies were sent each week by the biologist and chemist respectively to the chiefs of the Bureaus of Bacteriology and Chemistry and of the Brooklyn Department of Health up to June.

After that time all reports were made direct to the Commissioner of Health. A clerk and two assistants were found ample to do the necessary work other than the strictly analytical.

In addition to the analytical routine, systematic inspections were made of the sources of supply. Diagrams of conditions constituting nuisances found were prepared, drawn to scale, and records kept of the sanitary condition of the supply.

In several instances reports were made to the Commissioner of Health respecting these sources of pollution, but the necessary legal authority for their abatement was lacking under the existing charter of the City of Brooklyn. In one case an appeal to the State Board of Health was made. Action as a result of this appeal was not taken, however, until after the supply on which existed the nuisances complained of, had been placed out of service. The attention of the State Board of Health was called to the fact that its regulations did not apply in any instance to the minimum distance of sources of pollution in the case of driven wells. Although of less importance than in the case of surface waters, it was deemed advisable to ask for regulations bearing on this point. The inspection of several classes of typhoid fever in proximity to sources of supply was carried out and the disinfection of the premises directed.

Methods of Analysis.

CHEMICAL.

The methods followed in the chemical examination of the water were those usually employed in sanitary water analysis. Differences in the methods used in certain determinations previous to July from those subsequent to that time are stated beyond in the section preceding the tables. With these exceptions the methods used were approximately the same in both periods, and together with the additional determinations carried on during the latter part of the work, are described as follows :

A set of terms was employed to describe the turbidity, sediment and odor, making use of appropriate words to designate the relative degree of each as far as such a method would permit. The color was estimated by a comparison with Hazen's platinum-cobalt color standards.

The nitrogen as free and albuminoid ammonia was determined by the Wanklyn, Chapman and Smith method, with such modifications as more recent authorities have recommended.

The nitrogen as nitrites was estimated by Warrington's modification of the Griess method and the nitrates by the phenol-sulphonic process of Grandval and Lajoux.

The copper-zinc couple method, for the estimation of the nitrates in the water, was used up to June and the phenol-sulphonic process after that time. The two methods have given such widely differing results that no attempt has been made to deduce any conclusions from the two sets of figures taken together. As the phenol-sulphonic method gave results which seemed to be very much more probable as approximating the actual quantity of nitrates present, and were confirmatory in a general way of results obtained at other places in this section of the United States, they alone, with one or two exceptions, have been used in compiling averages and in drawing conclusions.

The Kubel hot acid method was employed in the determination of the oxygen consumed.

The residue on evaporation was determined on the filtered sample and the loss on ignition was obtained, after heating the platinum dish containing the residue by radiation from a larger platinum dish within which the former was placed.

The hardness was determined by Clark's soap method.

The chlorine was estimated in the usual way by concentration of 200 C. C. of the water to about 25 C. C. and titration with a standard solution of silver nitrate, using potassium chromate as an indicator.

The iron was determined by a colorimetric method based upon the formation of ferric thiocyanate and a comparison of the samples in tubes with standards prepared at the same time (Thompson Jour. Chem. Soc., Vol. XLVII., p. 493, 1885).

For full descriptions of these methods the reader is referred to Wanklyn's "Water Analysis," Leffman's "Examination of Water," and Reports of Massachusetts State Board of Health for 1889.

MICROSCOPICAL.

The microscopical examination of the water during this investigation was carried out on the lines and by the methods first established by Prof. W. T. Sedgwick and George W. Rafter, and further developed by D. D. Jackson, formerly of the Massachusetts State Board of Health Laboratory, and George C. Whipple, formerly Biologist of the Boston Water Board. This form of analysis was described as applicable to drinking water, in order to determine, for hygienic purposes, the character of the contents visible under the microscope, by MacDonald, in 1875. In the hands of various investigators, the method of examination has been refined, but the primary object remains the same. The quantity as well as the kind of each species of animal or vegetable organism observed may be recorded. Matter other than organic may be quantitatively estimated by the use of a standard unit of size, and this method of estimation has been applied to the organisms themselves.

The essentials of the process are well described elsewhere.*

---

*D. D. Jackson. On an Improvement in the Sedgwick-Rafter Method. Technology Quarterly, Vol. IX., 4896. G. C. Whipple. Experience with the Sedgwick-Rafter Method. Ibid.

BACTERIOLOGICAL.

The bacteriological examination of the water was limited during this investigation to the quantitative estimation of the bacteria found, and to the search for the colon bacillus. A number of species were isolated and worked out, but the unsatisfactory state of species differentiation with regard to water forms, made it appear advisable to withhold a set of descriptions which would only add to the confusion already existing.

The isolation and identification of a variety of bacillus prodigiosus, so far as the literature of the subject permitted, was the only complete work in this line accomplished. The quantitative bacterial work was conducted on the lines and methods elaborated by George W. Fuller, formerly of the Lawrence (Mass.) Experiment Station, now of Louisville. The medium selected for the work was nutrient gelatin, since the consensus of opinion amongst bacteriologists pointed to this as the most generally satisfactory for this purpose. Most of the quantitative work hitherto done has been based on the use of gelatin, and for the sake of comparability of results, if for no other, its use here was thought desirable.

In order to further secure comparability of results great care was exercised in following a rigidly uniform technique in the preparation and treatment of the media, and in the process of plating and counting.

Experience demonstrated that amongst the other essentials to uniformity of results insisted on by previous writers, one in particular should not be neglected. It is a common practice to make up a considerable amount of gelatin at one time, to tube some of this at once and to preserve the remainder by sterilizing it in bulk; when the tubes filled at the time of making the gelatin are exhausted, some of the bulk gelatin is tubed and used as before. This is continued until the whole of the original gelatin is exhausted when a fresh batch is made up.

If, however, the gelatin first tubed be compared with the gelatin of the same batch kept in bulk and subsequently tubed, by plating from the same sample of water on both gelatins, it will be found that the bulk gelatin usually gives counts lower than the tube gelatin.

This is, perhaps, due to the repeated sterilization of the bulk gelatin which is necessary after each withdrawal of a portion for tubing, and to the fact that sterilization of media in bulk requires a longer time in order to insure thoroughness than sterilization of small quantities. The heating which the bulk gelatin thus receives in excess of that which the tube gelatin receives, seems to deteriorate its nutritive quality in some way or other.

The rule has been followed, therefore, of tubing all the gelatin from each batch made up at once, keeping none in bulk, with very satisfactory results (see table beyond).

Comparisons between nutrient gelatin and nutrient agar as media for quantitative estimation of bacteria were made, the evidence apparently pointing to the former as the most generally advisable.

A large number of checks were used throughout the work, with results confirmatory of the general precision of the methods followed.

Comparison of the counts obtained by plating one C. C. of water from a sample directly, and by plating the same water after dilution with sterilized water, usually in the proportion of 1 to 100, brought out the following general conclusions:

The calculated number of bacteria per C. C. obtained from the diluted water was usually higher than the number obtained directly from the undiluted water itself. A sufficient number of blanks having shown that this was not due to any marked difference in the sources of error of one method as compared with the other, the conclusion has been reached that several factors other than technical are to be considered. It is true that the amount of shaking which the sample is given in order to ensure thorough admixture may affect the results. It has been held that the shaking tends to break up chains of bacteria and zoöglea masses to some extent, and thus allows the development of more single colonies, proportionately, from the diluted than from the undiluted water. This is, probably, more evident in dealing with sewage than with ordinary potable waters.

To secure, as far as possible, a greater comparability of results from diluted and undiluted samples, the plan of shaking each one hundred times before plating has been followed, but without entirely obviating the discrepancy previously observed. Another factor which must be considered, is the number of bacteria which

the amount of media (5 C. C.), used in plating, is capable of supporting. It is a well-known fact that, in pouring plates from successive dilutions of a pure culture, the individual colonies are largest in the plates containing the fewest total number of colonies. In other words, the fewer the number of bacteria in proportion to the available food, the greater the development of the colonies. Moreover, it is true, also, of pure cultures that the calculated number per C. C. from high dilutions is greater than the calculated number per C. C. from the lower dilutions or from the undiluted sample. It would appear, then, that the overcrowding of a plate, where pure cultures are used, results in the suppression of certain individuals presumably the weaker ones, which may, nevertheless, develop in a less crowded plate.

Water usually yields mixed cultures and the suppression of certain forms in an overcrowded plate in such cases results, to some extent, from a certain direct interference of the colonies of one species with those of another, more apparent than the interference of colonies of the same species with each other, and in addition to the mere excess of absorption of food by stronger individuals. This point is confirmed by the fact that calculated counts from diluted water approximate counts from the same water undiluted much more closely when both are low in number than when the former are very high. The increased effect of liquefaction in crowded plates does not appear to be a wholly satisfactory explanation. Indeed, it may be stated in general terms that up to 500 bacteria per C. C. fairly uniform results may be obtained by either method of plating. When the water contains more than this number the counts obtained from the undiluted water are often very much lower than the counts from the diluted water.

The discrepancies found in duplicate plates, either both diluted to the same extent or both undiluted, a subject of discussion amongst water bacteriologists, are not greater than might be expected when it is remembered how wide may be the discrepancies in duplicate determinations in certain physical and chemical work. It is hardly to be expected that successive quantities of one C. C., each withdrawn from a sample, just after violent agitation, should always contain exactly the same number of bacteria, which in such cases may be looked upon as nothing more than minute particles

of matter suspended in the rapidly moving water. Nor if the sample is allowed to stand will the discrepancy be less, since the factor of sedimentation amongst others is then introduced. As a matter of fact, the discrepancies observed do not affect the general value of the results. Differences in the significance of bacterial counts do not depend on differences of ten or even of fifty colonies per C. C. in the count, and variations within such limits do not invalidate general deductions. In very high counts particularly the significant difference becomes a matter of thousands of colonies and not of individuals.

Certain tables are appended, showing results bearing on these different points, obtained during this investigation.

Tables Illustrating Discussion of Bacterial Quantitative Technique.

Blanks.

The working error due to bacteria reaching the plates from the air or apparatus used in the process of plating is shown below. It will be seen that in pouring plates, without the addition of any water at all, the error is smaller than when they are poured from the sterile water used for dilution, probably because the latter process nearly doubles the manipulations necessary, the apparatus used and the time of exposure.

Plates poured without the addition of water.

Number of plates 132. Number of colonies on fourth day 73.

Number of colonies per plate 0.5.

Plates poured, with the addition of one C. C. of the sterile water, used for dilution of samples. Number of plates 52. Number of colonies on fourth day 86. Number of colonies per plate 1.6.

Duplicates.

The working error due to the technical difficulties in making an exact estimate of the number of bacteria present in a sample of water, even of those capable of growing in the nutrient media used under the ordinary conditions, are shown in the two following tables :

The obtaining of two counts exactly alike from the same sample, at the same time and under the same conditions, is not always accomplished; the reasons have been discussed above.

Duplicates giving counts below ten bacteria per C. C. Number of counts made in duplicate, 17.

Average for first plate poured, 3.0 bacteria.

Average for second plate poured, 3.5 bacteria.

Duplicates giving counts between ten and one hundred bacteria per C. C. Number of counts made in duplicate, 15.

Average for first plates poured, 28.5 bacteria.

Average for second plates poured, 27.2 bacteria.

Duplicates giving counts above one hundred bacteria per C. C. Number of counts made in duplicate, 35.

Average for first plate poured, 487.0 bacteria.

Average for second plate poured, 484.6 bacteria.

The difference between the two counts obtained was less than ten per cent. of the first count, in one-half the determinations; less than twenty per cent., in three-fourths of the determinations; less than thirty-three per cent. in all the determinations.

The obtaining of two plates alike from the same sample is even more difficult, when one of the plates is poured with that modification of technique involved in diluting the water, as may be necessary when high counts are expected. The table given shows that such results are comparable only when the number of bacteria in the water is low.

RELATION OF COUNTS ON UNDILUTED TO COUNTS ON DILUTED WATER.

Samples showing number of Bacteria.	Total number of samples.	Percentage of plates from undiluted samples found liquefied.	Number of plates in duplicate compared.	Average counts from undiluted water	Average counts calculated from the same water diluted 1:100.	Percentage which count from undiluted water is of count from diluted water.
Below 500 per c. c.	96	18%	79	220	270	80%
Between 500 and 1,000 per c. c.	65	37%	71	400	773	50%
Between 1,000 and 1,500 per c. c.	37	40%	22	630	1240	50%
Between 1,500 and 2,000 per c. c.	33	58%	14	755	1800	42%
Above 2,000 per c. c.	90	66%	30	1723	4700	37%

Comparison of consecutive batches of media:

The degree of uniformity obtained in the making of media with the special precaution before described as insuring uniformity in the number of bacteria estimated is shown by the following table, which gives the counts made from the same sample at the same time on gelatin from the last tubes of a nearly exhausted batch and some of the tubes of the succeeding batch.

Gelatins compared.	No. of Samples plated.	Bacteria per C. C. on old batch.	Bacteria per C. C. on new batch.
Batch 1 with batch 2	5	132	150
Batch 2 with batch 3	6	250	243
Batch 3 with batch 4	9	273	269
Batch 4 with batch 5	6	156	168
Batch 5 with batch 6	9	231	223
Batch 6 with batch 7	6	379	394
Batch 7 with batch 8	10	191	184

INTERPRETATION OF ANALYTICAL RESULTS.

CHEMICAL.

The substance sought for in the chemical examination of a water may be divided into two distinct classes, namely, the mineral and the organic.

In considering a water from a sanitary point of view, it is chiefly the organic matter which it contains that requires attention. Certain of the mineral constituents, however, play important parts, some as indicators of changes which are taking place, and others as showing certain events connected with the past history of the water. The organic matter present in a water, which is exposed to light and air, is derived from the particles floating in the air and washed out by the falling rain ; from the vegetable matter on the surface and in the upper layers of the soil, and from the passage into it of the "waste matters of human life and industry."

It is the material from the last mentioned source which is the most dangerous. The present theory of water-borne diseases indicates that direct infection is the result of the entrance into the body of pathogenic bacteria, and that their subsequent passage from the infected individual into this "waste matter" is the natural course which they pursue.

It is evident, therefore, that the history of this organic matter, with which such bacteria may be associated, should be carefully studied.

The organic matter found in water is composed principally of carbon, nitrogen, oxygen and hydrogen in varying proportions. It may be either living, as in microscopical plants, bacteria and animal organisms, or dead, as in broken down vegetable and animal tissue.

The dead matter may have passed beyond the first stage of decomposition and become partially or wholly mineralized by the

conversion of the nitrogen into ammonia, nitrites or nitrates, and the carbon into carbonic acid or carbonates. These changes are constantly going on ; the mineral matter thus formed is absorbed by plants, which in turn break down and pass again into the mineralized condition.

The relative proportion of nitrogen and carbon, which the organic matter of a water contains, may throw some light on its nature. Animal tissue and the products of its disintegration contains a relatively larger proportion of nitrogen to carbon than does the vegetable matter commonly dissolved in surface waters. The former material is much more rapidly disintegrated than the latter, which is very stable in character.

The products of these changes and the rapidity with which they develop, yield evidences of the nature of the material in the water.

Surface waters are much more open to direct pollution of a dangerous character than ground waters, which, by the filtration they receive in passing through the ground, and the purifying action to which the organic matter they may contain is subjected, are rendered less liable to become carriers of disease.

In order that the meaning of the results of the chemical analysis of water may be understood, a consideration of the relations involved in the various determinations is necessary. These are briefly discussed below :

Nitrogen is a necessary constituent of all organized matter, and since it can be readily detected, is the substance sought for as indicating, by its various combinations, the presence, character and approximate amount of the organic matter. There are four conditions of nitrogen for which a water is examined, namely, nitrogen, determined as "albuminoid ammonia," "free ammonia," "nitrites," and "nitrates." These represent, in the order given, the changes which the nitrogen undergoes in its passage from the organic condition through the several stages of oxidation to its completely oxidized form as nitrates.

The nitrogen determined as "albuminoid ammonia" represents the nitrogen obtained from the organic matter before decomposition has commenced, and which is set free by the oxidizing agents employed in the determination. The amount of nitrogen thus obtained depends on the nature of the organic matter from

which it is derived. The character of this material, therefore, rather than its absolute quantity, as indicated by the amount of nitrogen, is the important point.

The nitrogen determined as "free ammonia" is the nitrogen obtained from the products of the first stages of oxidation of the organic matter.

In organic matter of an unstable character, such as is found in water as a result of the admission of sewage, this change takes place rapidly and in consequence a great deal of nitrogen is found in this form in water recently polluted. Free ammonia, therefore, is an evidence of pollution, but such evidence should be carefully substantiated by other proof since the amount varies from time to time and may even be considerable as a result of natural conditions.

The nitrogen found as "nitrites" shows the next stage of oxidation through which the nitrogen of the organic matter passes before sending its completely oxidized condition in the form of "nitrates." It is probably through the activity of the bacteria present in the water that this change is effected. Nitrites may be regarded as an evidence of the instability of the organic matter in the water, and points to an improper balance between reduction and oxidation, which seems to be so accurately adjusted in most natural water. Nitrites, when in considerable amount, therefore, may be considered just as in the case of the "free ammonia" as an evidence of pollution, although there are exceptions which are the result of special conditions, and which are not to be interpreted in the usual way. The nitrogen found as "nitrates" represents the fully oxidized state of the nitrogen and may be considered as in the form farthest removed from the condition in which it first existed as a constituent of living matter. It therefore indicates in water known to be polluted the extent to which purification has taken place.

Normal surface water usually contains nitrates, but not in large amounts, although they may be present in considerable quantity for some special reason connected with the character of the soil with which the water comes in contact. Ground water usually shows very much higher nitrates than surface water, on account of the opportunity afforded for the nitrogen in the water to become oxidized

in its passage through the ground. The meaning of the amount of nitrates found in a water must be considered with reference to the other forms of nitrogen present and not to the absolute quantity.

The significance of the results obtained in the determination of the nitrogen in its four forms, rests upon the relation which these forms bear to each other rather than to their absolute amounts.

The term "oxygen consumed" in the chemical analysis of water refers to the amount of oxygen used in oxidizing the organic matter under the conditions imposed in the determination. The carbonaceous matter is attacked almost exclusively by this process, but is never entirely oxidized. The varying character of the organic matter in different waters and even in the same water at different times, renders this determination of doubtful value as an accurate measure of the organic matter present. But as a means by which the variations in the amounts of the organic matter in the same class of waters may be approximately estimated it is certainly of some use.

There is some relation between oxygen consumed and color in surface waters, probably due to the carbonaceous character of the vegetable coloring matter. This relation, however, is not uniform.

The presence of oxidizable salts in a water effects in value this determination, if they are present in appreciable amounts.

The residue left on the evaporation of a water comprises those organic and mineral matters present in it which are not volatile at the temperature employed.

The mineral matter consists principally of iron, alumina, lime, magnesia, soda and potash combined with hydrochloric, sulphuric, nitric, carbonic and silicic acids. From a sanitary point of view, the soluble mineral constituents of a water have no particular significance.

The "loss on ignition," if determined by the method previously described, represents approximately the total organic matter present in the water, but the determination has no special sanitary significance. If in a surface water the "loss on ignition" is large and considerable blackening of the residue occurs, it may indicate vegetable organic matter, or possibly the presence of iron salts.

The hardness of a water depends principally on the salts of lime and magnesia which it contains and may be measured by their action upon a solution of soap. These salts consists largely of sulphates, chlorides and carbonates. The latter salts produce "tem-

porary hardness," while the two former cause "permanent hardness."

"Temporary hardness," strictly speaking, is that hardness which is removed by boiling the water. The carbonic acid which holds the carbonates of lime and magnesia in solution, is thus removed, and they precipitate out. However, boiling will not throw all the carbonates out of solution, and about three parts per hundred thousand (expressed in terms of C_aCO_3) will still remain. Upon the fact that the "temporary hardness" is due to carbonates in solution, is based Hehner's acid method, which is a direct titration with acid for the carbonates present in the water.

The hardness, due to the presence of the sulphates and chlorides of lime and magnesium, is termed "permanent hardness." Water containing sulphates of lime and magnesia is particularly detrimental when used in boilers on account of the hard scale which they form.

The chlorine contained in a water is of considerable sanitary significance, provided the normal chlorine of the region is known. In normal surface waters the chlorides present are not very large in amount, but vary according to the distance from the sea. The rain precipitated near the coast contains a larger proportion of salt than that which falls farther inland.

Ground waters do not usually vary very much in the chlorine they contain from surface waters, but may sometimes contain very much higher amounts, due to the soluble chlorides with which they come in contact in their passage through the soil.

Chlorides are found in sewage in considerable quantities, and since they always remain dissolved, form one of the most valuable indicators of the contamination of a water by sewage. The excess of chlorine present in a water over the amount normal to it indicates sewage pollution.

The iron which a water contains has no particular sanitary significance. Its presence in considerable amounts renders the water unserviceable for domestic purposes, and undesirable for drinking. Surface waters rarely contain iron in objectionable quantities, and it is chiefly in ground water derived from wells that difficulty from its presence arises.

When the iron in a ground water is held in solution by carbonic acid, it becomes oxidized and precipitates out within a very short time after being exposed to the light and air. Iron present in this form is easily removed, but if present as a sulphate, or if it is kept

in solution by the presence of organic matter, then a very much more difficult problem presents itself.

MICROSCOPICAL.

The sanitary significance of the results obtained from the microscopical examination of water rests rather on the recognition of substances derived from waste matters than of micro-organic life typical of sewage. These substances consist of the general debris of house drainage, muscle fibre, starch grains, epitheliun, etc., and are not usually found unless the sewage pollution is recent and considerable in amount.

The detection and enumeration of organisms by this method is valuable in determining the cause and source of certain disagreeable features of odors, taste and appearance, which are at times found in the water, and which are more fully discussed elsewhere. In this connection, and as a means of tracing relations between different classes of water, the microscopical examination is valuable.

BACTERIAL.

Bacterial quantitative analysis, as at present made, does not allow the determination of the absolute number of bacteria present in the water examined.

An approximation to the number of those bacteria present in the water at the moment of examination, which are capable of developing in the particular medium used under the particular treatment to which the medium is subjected, both before and after plating, can, however, be obtained. A quantitative bacterial result is then simply the *bacterial reaction of the water examined to the media employed, under the conditions imposed.*

Similar statements are also more or less true of the chemical analysis of water. The fact that all of the bacteria present in a given water cannot be determined finds a parallel in the fact that but about half the organic nitrogen of a water can be determined by the ordinary "albuminoid ammonia" process. The fact that a given number of bacteria does not always have the same sanitary significance is comparable with the fact that a given amount of chlorine likewise may have widely different meanings at different times or in different places.

The working error of bacterial analysis is large, it is true, but the differences between different determinations are much larger still, before they become of sanitary significance.

A rigidly uniform technique is as necessary to comparability of results in chemical as in bacterial work.

Granted, then, that quantitative bacterial work is reasonably precise, compared with other forms of analysis, when properly carried out, the significance of the results actually obtained remains to be discussed.

With the foregoing proposition, as a basis, the interpretation of bacterial results is relegated to a position bearing the same relation to final conclusions that the results of any other single determination holds.

The number of bacteria in a given water is dependent on a large number of factors. The problem is to so determine these factors and their relationships as to permit of deductions being made of practical value. At first sight this would appear impossible. The factors which control the development and multiplication of bacteria in water supplies are but partially understood. Temperature, the amount of agitation of the water, the exposure to light and air, the composition of the water, and, perhaps, meteorological conditions not known definitely, all enter into the result. It must be remembered, however, that the chemical constituents of water vary also, and, to some extent, with the factors above enumerated. It is true that the chemical constituents are devoid of life, nevertheless the rapidity with which they change in composition and the complexity of these changes, are little short of those displayed in biological processes. Indeed, many of the chemical changes continually occurring in water result from and keep pace with the presence and activity of living organisms. Yet chemical analyses are of great value in determining the condition of a water, because in spite of the immense number of factors involved, the general trend of the processes, as a whole, is understood sufficiently well to allow the drawing of general conclusions. On the same grounds, and with the same limitations, must bacterial results also be interpreted.

From the nature of the case, and growing out of the admissions already made to the effect that comparatively little is known in detail of the ultimate processes, either chemical or biological, occurring in water, it is evident that many of the conclusions arrived at as to the significance of both chemical and biological results must be based on knowledge at least partially empirical.

The application of the interpretation of bacterial results has been discussed elsewhere in this report ; certain general statements may be made, however.

A consideration of the results obtained from bacterial quantitative examinations of water show at once that great differences exist between ground and surface waters, as regards the number of bacteria they contain. Surface waters, as a rule, show higher counts than ground waters. The latter, however, show proportionately greater fluctuations.

In surface waters there is a more or less definite relation between the amount of agitation of the water and their bacterial count. The greater the agitation the higher the counts ; the less the agitation, up to a certain point, the lower the counts. This is especially marked in rivers and streams having swift currents.

Rain-fall, as a factor, is marked, sometimes increasing, sometimes decreasing the counts.

The temperature does not appear to have much influence.

The amount of organic matter present in the water would appear to be the controlling factor, where violent agitation of the water is not constant, as in ponds and sluggish streams. A given quantity of organic matter, as determined by the albuminoid ammonia process, of vegetable origin does not appear to have the same effect on bacterial counts as the same amount or even a much smaller amount of organic matter of animal origin.

In general, it may be stated that the results of this investigation show, as a whole, that bacterial quantitative examinations have a distinct value, not only in so far as they appear to correspond closely with known physical conditions of relative purity, but also in so far as they coincide with, confirm and explain certain of the evidence obtained from chemical sources.

The value of a decision regarding the character of a water and its suitability for a public supply is dependent on the character and amount of evidence presented. If the evidence is partial, then the value of the decision is limited ; if the evidence is complete, so far as the present knowledge of the subject will permit, then the decision is final.

From the standpoint of quality there are two principal methods of obtaining this evidence. The first consists of thorough physical examination of the sources of supply, the second of analytical examination of the water itself for a sufficient length of time by chemical, microscopical and bacterial means. The first method determines conditions which cannot be recognized in detail by analytical processes, while the second determines conditions otherwise dependent only on inference. These two methods, therefore, supplement each other, and together yield, as far as present knowledge goes, all the evidence available.

The proper weight to be given to each of the various facts thus obtained requires careful consideration, and it is only by the systematic study of all the factors in the problem that a correct judgment can be reached.

CHEMICAL, MICROSCOPICAL AND BACTERIOLOGICAL ANALYSES AND METEOROLOGICAL DATA.

The following tables show the results of the analytical work carried on between December, 1896, and October, 1897.

The chemical results, previous to the organization of the laboratory on the present basis in July, were obtained by one of the assistant chemists of the Health Department. Certain of the methods then used differed from those employed subsequently ; these are described below.

The total solids determination was made on the unfiltered sample. The fixed solids were determined after ignition over a free flame. The nitrates were estimated as ammonia by the copper-zinc couple method.

A different set of terms were used in describing the physical characteristics. These terms are given, with their abbreviations, below, together with the scale of terms used subsequent to July.

The chemical, microscopical, and bacteriological results are given for each of the sources of supply, and are grouped together for ready comparison.

The results of the analyses of the feeders are given immediately following those of the ponds they supply. The well waters are tabulated by themselves.

The chemical analyses have been tabulated in the usual form, except that the order of the determinations has been slightly changed.

The microscopical results are arranged in tabular form as follows. Each individual analysis is arranged in a vertical column, showing from above downward the number of the sample in the microscopical series, the date of collection and the temperature, when obtained, of the water at the time of collection. Then follow the

numbers in heavy type, representing the total number of organisms belonging to each family of plants or animals found in each sample.

Under the numbers for each family are placed the numbers representing the genera belonging to that family which were found in quantities of five or more organisms per c.c. The names of genera occurring in quantities of less than five per c.c. have been omitted from the tables to save space, but their numbers have been included in the totals for the different families wherever they were found. At the bottom of each column is placed the total number of organisms for that sample, which is the sum of the totals of each family recorded. Below the number of total organisms is placed the number of genera found, including both those tabulated as occurring in quantities of five or more per c.c. and those occurring in quantities less than five.

In the same column with the microscopical analysis of each sample is placed the corresponding bacterial quantitative result for the same place and day.

All the microscopical results obtained from January to October have been included in the tables. Inasmuch as a larger number of bacterial analyses than of microscopical analyses were made, these have been omitted when no corresponding microscopical result was recorded.

These tables do not therefore give the full results of the bacterial work, which will be found tabulated by themselves, but only those which were made parallel with the microscopical work. The omitted figures have nevertheless been used in compiling the averages for the whole period of observation. Below each bacterial quantitative result is given the rain-fall in inches computed for seven days immediately preceding the date given at the head of the columns—*i. e.*, the date of collection of the sample.

Below the figure for the rain-fall is given the mean atmospheric temperature for the week in which the sample was collected.

Finally, below each table of microscopical and bacterial results for each locality is appended a list of those microscopical genera which were found at any time during the whole period of observation at that locality, but which never occurred in quantities of five or over per c. c.

NOTE—The meteorological statistics have been compiled from the weekly summaries furnished to the Health Department by Prof. W. C. Peckham, of the Adelphi Academy, Brooklyn.

NOTE.

The descriptive terms used under "Appearance" in the chemical tables are classified as follows: The terms used previous to July were different from those following that period, and are given first. Turbidity is characterized as "slight," "medium," "minute vegetable" and "opalescent." Abbreviations—turb., sl., md , min., veg. and opal

Sediment is described as "slight," "slight vegetable," "medium vegetable," "considerable vegetable" or "considerable earthy." Abbreviations similar to above : con. for "considerable."

Odor is described as "slight marshy," "marshy," "vegetable" "medium vegetable," "offensive" and "offensive vegetable."

Color is characterized as "normal," "slight straw" and "medium straw."

Following July the terms employed to express the degree of turbidity were : "very slight," "slight," "distinct" and "decided," and the degree of sediment by "very slight," "slight," "considerable" and "heavy."

The odor is described as "vegetable," "marshy," "grassy," "sweetish," "unpleasant," "disagreeable," "mouldy," "musty," "earthy," "offensive," "aromatic," "fishy" and "tarry," and the strength of the odor by "very faintly," "faintly," "distinctly" and "decidedly." The abbreviations used are self-evident.

CHEMICAL EXAMINATION OF WATER FROM MASSAPEQUA POND; GATE HOUSE. (Parts per 100,000).

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
1	Dec 14							.0006	.0138			.0000	.0325		5.00	2.80	2.20		0.60	
	1897																			
27	Jan 5							.0004	.0040			.0000	.0425						0.60	
42	18							.0007	.0053			.0000	.0587		3.80	1.40	2.40		0.50	
74	Feb 2							.0010	.0046			.0000	.0815						0.55	
98	8							.0002	.0026			.0000	.0558						0.55	
141	17							.0007	.0061			.0000	.0818						0.60	
159	24							.0012	.0116			.0000	.0484						0.55	
197	Mch 3							.0000	.0070			.0000	.0453		6.20	3.70	2.50		0.60	
214	9							.0000	.0048			.0000	.0535						0.60	
252	18							.0002	.0098			.0000	.0488						0.60	
266	23							.0002	.0090			.0000	.0534						0.60	
306	Apr 1							.0002	.0076			.0000	.0822						0.65	
322	6							.0003	.0105			.0000	.0576		5.00	2.80	2.20		0.60	
357	13							.0000	.0236			.0000	.1235						0.60	
382	21							.0000	.0190			.0000	.0741						0.60	
406	29							.0000	.0046			.0000	.0700						0.60	
434	May 5	57°	clear	none	md. straw		none	.0002	.0123			.0000	.0819		4.70				0.60	
465	13	57°	clear	none	md. straw		sl. marshy	.0003	.0111			.0000	.0492						0.60	
497	19	59°	clear	none	sl. straw		sl. marshy	.0000	.0340			.0000	.0618						0.60	
541	26	58°	clear	none	sl. straw		none	.0000	.0270			.0000	.0741						0.60	
581	June 3	59°	clear	none	sl. straw		sl. marshy	.0000	.0130			.0000	.0576		4.20	2.00	2.20		0.60	
632	10	55°	clear	none	md. straw		sl. marshy	.0029	.0386			.0000	.0717						0.60	
644	14	65°	clear	none	md. straw		sl. marshy	.0000	.0215			.0000	.0741						0.60	
685	July 12	74°	v. slight	v. slight		decid. veg						.0000								
712	19	71°	none	v. slight	1.60	dist. veg	dist. veg	.0016	.0328			.0000	.0070						0.52	
738	26	68°	none	v. slight	1.45	dist. veg	dist. veg	.0030	.0316			.0000	.0050	1.45	6.10				0.44	
766	Aug 2	65°	none	v. slight	1.40	decid. veg	dist. veg	.0006	.0242	.0240	.0002	.0000	.0070	1.25	5.30	3.50	1.80	0.9	0.49	
802	9	66°	v. slight	v. slight	0.70	decid. veg	dist veg	.0006	.0162	.0126	.0030	.0000	.0070	0.69	4.70	2.20	2.50	0.8	0.56	
845	16	69°	v. slight	v. slight	0.45	dist. veg & marshy	dist. veg	.0012	.0158	.0140	.0018	.0000	.0150	0.41	3.80	2.00	1.80	0.8	0.58	
888	23	70°	v. slight	v. slight	0.43	faintly veg	dist. veg	.0010	.0098	.0098	.0000	.0000	.0150	0.38	4.20	1.70	2.50	0.8	0.54	
931	30	61°	none	v. slight	0.40	faintly veg	dist. veg	.0012	.0106	.0106	.0000	.0000	.0200	0.41	4.20	1.90	2.30	1.1	0.60	
973	Sept 13	61°	v. slight	v. slight	0.20	faintly veg	v. faintly veg	.0012	.0106	.0102	.0004	.0000	.0150	0.22	3.90	1.60	2.30	0.6	0.59	.0050
1044	30	55°	none	v. slight	0.12	v. faintly veg	v. faintly veg	.0002	.0052	.0052	.0000	.0000	.0170	0.12	5.00	1.70	3.30	0.5	0.56	.0050

CHEMICAL EXAMINATION OF WATER FROM MASSAPEQUA POND; WEST INLET. (Parts per 100,000).

No.	Date of Collection		Tem.	Appearance			Odor		Ammonia				Nitrogen as		Oxygen Consumed	Residue on Evaporation			Hardness	Chlorine	Iron
				Turbidity	Sediment	Color	Cold	Hot	Free	Albuminoid			Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
										Total	In Solution	In Suspension									
496	May	19	52°	sl turb.	con veg	sl. straw..	....	sl. marshy.......	.0005	.0220	.. .	....	.0000	.0490	....	.. .	..	..	..	.55	....
540		26	51°	clear ..	con.veg	sl. straw..	....	none	.0000	.0100	....	....	.0000	.0450	....	.. .	..	..	..	.55	.. ..
631	June	10	53°	clear ..	con.veg	sl. straw..	....	none	.0015	.0225	....	....	.0000	.0358	.	....	..	. .	..	.60	....
643		14	64°	clear ..	sl. veg..	md. straw	....	sl. marshy.......	.0000	.0115	....	....	.0000	.0535	..	....	..	.	..	.55	.....

CHEMICAL EXAMINATION OF WATER FROM MASSAPEQUA POND; EAST INLET. (Parts per 100,000).

No.	Date of Collection		Tem.	Turbidity	Sediment	Color	Cold	Hot	Free	Total	In Solution	In Suspension	Nitrites	Nitrates	Oxygen Consumed	Total	Loss on Ignition	Fixed	Hardness	Chlorine	Iron
495	May	19	53°	sl. turb.	sl. veg..	sl. straw..	....	sl. marshy...........	.0024	.0121	....	.....	.0000	.0598	....	.....	....	...	....	.55	. ..
539		26	52°	clear .	con.veg	sl. straw..	....	none...............	.0003	.0207	.. .	....	.0000	.0513	....	... .	...	....	..	.60	.....
630	June	10	53°	clear ..	none ..	md. straw	....	sl. marshy..	.0027	.0418	.. .	....	.0000	.0842	....	.....	....	..	...	.60	. ...
642		14	65°	clear ..	sl. veg..	md. straw	....	md. marshy..........	.0015	.0205	....	....	.0000	.0729	...	...	...	...	..	.60	.....
803	Aug	9	60°	v. slight	slight..	0.70	dist. veg............	faintly veg...........	.0002	.0132	.0132	.0000	.0000	.0100	0.64	4.90	2.20	2.70	0.8	.60	.. .
846		16	69°	v. slight	cons ..	0.45	dist. veg. & marshy..	dist. veg. & marshy..	.0016	.0164	.0128	.0036	.0000	.0130	0.43	. ..	..	. . .	0.8	.58	. ...
889		23	70°	v. slight	slight..	0.27	faintly veg....	dist. veg	.0010	.0068	.0066	.0002	.0000	.0130	0.27	4.60	2.00	2.60	0.8	.64	....
1045	Sept	30	49°	none...	cons.	0.10	v. faintly veg	v. faintly veg........	.0016	.0178	.0044	.0134	.0000	.0270	0.08	.....	....	...	0.6	.59	....

MICROSCOPICAL EXAMINATION OF WATER FROM MASSAPEQUA POND; GATE HOUSE. (No. per c.c.)

TABLE

Number	20	39	49	89	101	108	117	147	158	191	214	249	277	312	346
Date of Collection	1897 Jan 12	Jan 21	Feb 2	Mch 13	Mch 16	Mch 18	Mch 23	Apl 1	Apl 6	Apl 13	Apl 21	Apl 29	May 5	May 13	May 19
Temperature					Lost		Lost			50°	50°	54°	51°	57°	59°
Diatomaceæ	7	14	8	3		9		4	4	13	8	9	8	18	3
Eunotia										5					
Gomphonema															
Meridion														6	
Melosira										6	8	7			
Navicula															
Synedra															
Tabellaria														7	
Cyanophyceæ								1					2		
Algæ										4	1		7	38	1
Dictyosphærium															
Protococcus													6	30	
Raphidium															
Fungi															
Rhizopoda															3
Infusoria				3		1		3	1	16		1	82	123	13
Dinobryon									1	7				5	8
Dinobryon Cases															5
Euglena															
Monas										9				118	
Mallomonas															
Vermes									1						
Crustaceæ															
Total Organisms	7	14	8	6		10		8	6	33	9	10	99	179	20
Total Genera	4	2	3	4		3		5	5	7	2	3	9	10	6

Number	392	435	486	498	540	557	584	610	638	974	717	760	803	741	912
Date of Collection	May 26	J'ne 3	J'ne 10	J'ne 14	July 8	July 12	July 19	July 26	Aug 2	Aug 9	Aug 16	Aug 23	Aug 30	Sept 13	Sept 30
Temperature	58°	59°	55°	65°	74°	74°	71°	68°	65°	66°	69°	70°	61°	61°	55°
Diatomaceæ	2	2	10	1	19	21	3	5			9	13	18	12	48
Eunotia															
Gomphonema													7		
Meridion													5		
Melosira					5										
Navicula						9							5	6	20
Synedra					8	9								5	
Tabellaria											7	13			17
Cyanophyceæ					3	2				1					
Algæ	1			1	9	21	11	46	4	4	3	1	1	7	1
Dictyosphærium					7	21		12						7	
Protococcus								10							
Raphidium		1	1		1		8	21							
Fungi											1				
Rhizopoda											1				
Infusoria		23	1	1	58	37	1	85	23	31	1	5	2	24	3
Dinobryon		21				11								9	
Dinobryon Cases					58	25								8	
Euglena								57							
Monas								27	21	17					
Mallomonas										13					
Vermes	1														
Crustaceæ	1														
Total Organisms	5	26	12	3	90	81	15	136	27	36	15	19	21	43	52
Total Genera	5	4	6	3	14	9	8	12	5	6	7	4	7	8	7

BACTERIAL EXAMINATION OF WATER FROM MASSAPEQUA POND; GATE HOUSE (No. per c.c.)

TABLE I

Bacteria	390	310	423	260	215	...	350	210	600	415	170	140	240	460	760
Meteorological Statistics.															
Rain-fall in inches week preceding	.09	2 21	.98	.06	1.30	1.15	.81	.00	.28	1.50	1.00	.08	1.40	2.14	2.66
Date	Jan 16	Jan 23	Feb 6	Mch 6	Mch 20	Mch 20	Mch 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22
Mean temperature week ending	29°	31°	27°	35°	35°	35°	42°	42°	47°	47°	46°	53°	54°	60°	60°

Bacteria	820	280	350	210	....	....	400	Lost	1000	270	1000	2500	1700	2500	270
Meteorological Statistics.															
Rain-fall in inches week preceding	.95	1.64	2.16	.99	.75	.14	4.76	3.17	2.24	1.03	.81	.23	2.00	.00	1.17
Date	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the species tabulated above as occurring in quantities of five or more per C C, in any one determination, the following were also found: ***Diatoms***—Asterionella, Cocconeis, Cyclotella, Cymbella, Eunotia, Meridion, Nitzschia, Stephanodiscus. Pleurosigma; ***Cyanophyceæ***—Clathrocystis, Anabaena, Microcystis, Oscillaria; ***Algæ***—Arthrodesmus, Cosmarium, Pandorina, Scenedesmus, Staurastrum, Zygnema; ***Rhizopoda***—Actinophrys; ***Infusoria***—Cryptomonas, Trachelomonas, Uroglena, Uvella, Vorticella; ***Vermes***—Anguillula; ***Fungi***—Crenothrix, Molds.

MICROSCOPICAL EXAMINATION OF WATER FROM MASSAPEQUA POND.

(No. per c.c.) TABLE

	East Inlet								West Inlet			
Number	344	390	484	496	675	718	761	913	345	391	485	497
Date of Collection	1897 May 19	May 26	J'ne 10	J'ne 14	Aug 9	Aug 16	Aug 23	Sept 30	May 19	May 26	J'ne 10	J'ne 14
Temperature	53°	52°	53°	65°	66°	69°	70°	49°	52°	51°	53°	54°
Diatomaceæ	46	35	18	28	3	7	33	82	11	2	16	6
Asterionella	...	7	...	...	...	...	...	...	...	...	...	...
Cymbella	...	...	...	...	...	...	...	5	...	...	...	...
Eunotia	...	...	5	...	...	...	...	7	...	...	...	...
Melosira	...	...	...	18	...	...	16	7	...	...	...	...
Meridion	38	19	5	...	...	...	...	...	...	...	...	...
Navicula	...	...	...	...	...	...	...	20	5	...	10	...
Synedra	...	...	...	...	...	...	...	11	...	...	...	...
Tabellaria	...	...	...	5	...	6	12	30	...	...	...	...
Cyanophyceæ	...	...	...	...	...	...	1	...	...	...	1	...
Algæ	1	...	1	...	9	5	14	...	...	22	...	17
Desmidium	...	...	...	...	...	...	...	...	...	16	...	17
Hyalotheca	...	...	...	...	...	...	...	...	...	6	...	...
Zygnema	...	...	...	...	9	...	12	...	...	...	...	...
Fungi	1	1	2	...	1	...	1	...	2	...	1	...
Rhizopoda	...	...	...	2	...	...	...	...	...	...	...	...
Infusoria	...	...	...	...	16	...	3	1	...	...	...	...
Monas	...	...	...	...	5	...	...	...	...	...	...	...
Mallomonas	...	...	...	...	11	...	...	...	...	...	...	...
Vermes	...	...	...	1	...	...	...	...	...	...	...	1
Crustacea	...	...	...	...	...	...	1	...	...	...	...	1
Total Organisms	48	37	21	31	29	12	53	83	13	24	18	25
Total Genera	6	9	8	7	6	4	12	8	4	4	7	6

BACTERIAL EXAMINATION OF WATER FROM MASSAPEQUA POND.

(No. per c.c.) TABLE

	East Inlet								West Inlet			
Bacteria	250	300	3000	430	270	1300	1700	400	220	510	1800	300
Meteorological Statistics.												
Rain-fall in inches week preceding	2.66	.95	2.16	1.73	1.03	.81	.23	1.17	2 66	.95	2.16	1.73
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	Oct 2	May 22	May 29	J'ne 12	J'ne 19
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	60°	60°	60°	61°	68°

CHEMICAL EXAMINATION OF WATER FROM WANTAGH POND; GATE HOUSE. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
2	Dec 14	...	...	...	...	...	...	.0006	.0054	...	...	.0000	.0819	...	3.80	1.70	2.10	...	.60	...
	1897																			
28	Jan 5	...	...	...	...	...	...	.0006	.0026	...	...	.0000	.0818	...	...	...	...	...	.55	...
43	18	...	...	...	...	...	...	.0010	.0062	...	...	.0000	.0980	...	4.20	2.00	2.20	...	.50	...
76	Feb 2	...	...	...	...	...	...	.0035	.0013	...	...	.0000	.0741	...	...	...	...	...	.55	...
100	8	...	...	...	...	...	...	.0003	.0041	...	...	.0000	.0986	...	...	...	...	...	.55	...
143	17	...	...	...	...	...	...	.0002	.0028	...	...	.0000	.0986	...	...	...	...	...	.55	...
161	24	...	...	...	...	...	...	.0006	.0064	...	...	.0000	.0983	...	...	...	...	...	.55	...
199	Mar 3	...	...	...	...	...	...	.0002	.0060	...	...	.0000	.0987	...	...	...	...	...	.50	...
216	9	...	...	...	...	...	...	.0003	.0047	...	...	.0000	.1150	...	4.70	2.00	2.70	...	.60	...
253	18	...	...	...	...	...	...	.0000	.0050	...	...	.0000	.0988	...	...	...	...	...	.60	...
267	23	...	...	...	...	...	...	.0000	.0114	...	...	.0000	.1070	...	...	...	...	...	.55	...
308	Apl 1	...	...	...	...	...	...	.0000	.0072	...	...	.0000	.1318	...	...	...	...	...	.55	...
324	6	...	...	...	...	...	...	.0006	.0078	...	...	.0000	.0983	...	4.20	1.90	2.30	...	.45	...
358	13	...	...	...	...	...	...	.0000	.0156	...	...	.0000	.0659	...	...	...	...	...	.60	...
383	21	...	...	...	...	...	...	.0003	.0107	...	...	0000	.0739	...	...	...	...	...	.50	...
407	29	.	...	...	none	...	none	.0000	.0070	...	...	.0000	.0988	...	...	...	...	...	.55	...
435	May 5	59°	clear	none	sl. straw	...	none	.0004	.0106	...	...	.0000	.0820	...	...	...	...	...	.55	...
466	13	59°	clear	none	sl. straw	...	none	.0000	.0132	...	...	.0000	.1070	...	5.60	3.50	2.10	...	.60	...
502	19	62°	sl. turb.	none	sl. straw	...	none	.0002	.0183	...	...	.0000	.0904	...	...	...	...	...	.55	...
546	26	62°	clear	none	sl. straw	...	none	.0000	.0070	...	...	.0000	.1070	...	...	...	...	...	.60	...
583	June 3	63°	clear	none	sl. straw	...	none	.0006	.0129	...	...	0000	.06:6	.	4.60	1.10	3.50	...	.55	...
637	10	58°	clear	none	sl. straw	...	none	.0003	.0287	...	...	.0000	.0574	...	...	...	...	.	.55	...
649	14	62°	clear	none	sl. straw	...	none	.0000	.0135	...	...	.0000	.0741	...	...	...	...	...	.50	...
686	July 12	76°	v. slight	v. slight	...	dist. veg	...	...	...	...	...	...	...	...	...	...	...	...	...	...
713	19	74°	v. slight	v. slight	0.80	dist. veg	faintly veg	.0008	.0280	...	...	.0000	.0230	...	...	...	...	...	.49	...
739	26	72°	v. slight	v. slight	0.40	dist. veg	faintly veg	.0008	.0190	...	...	.0000	.0200	0.62	5.60	...	...	...	.51	...
767	Aug 2	72°	v. slight	v. slight	0.50	dist. veg	dist. veg	.0006	.0198	.0190	.0008	.0000	.0250	0.63	5.00	3.00	2.00	0.9	.54	...
805	9	74°	v. slight	slight	0.28	dist. veg	dist. veg	.0006	.0136	.0128	.0008	.0000	.0230	0.36	5.40	2.20	3.20	0.8	.55	...
848	16	75°	v. slight	v slight	0.23	faintly veg	faintly veg	.0002	.0150	.0136	.0014	.0001	.0250	0.32	4.40	2.60	1.80	0.8	.53	...
890	23	72°	v. slight	v. slight	0.23	v. faintly veg	dist. veg	.0010	.0122	.0108	.0014	.0000	.0330	0.27	4.60	1.70	2.90	0.8	.55	...
932	30	72°	v. slight	v. slight	0.25	faintly veg	dist. veg	.0012	.0140	.0124	.0016	.0000	.0300	0.35	4.20	1.90	2.30	0.6	.54	...
975	Sept 13	70°	v. slight	slight	0.15	faintly veg	faintly veg	.0012	.0114	.0102	.0012	.0000	.0330	0.20	4.40	1.60	2.80	0.6	.51	.0120
1048	30	60°	v. slight	slight	0.15	v. faintly veg	none	.0012	.0106	.0096	.0010	.0001	.0300	0.11	5.80	2.50	3.30	0.6	.54	.0100

CHEMICAL EXAMINATION OF WATER FROM WANTAGH POND; EAST INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
498	May 19	66°	clear ..	sl. veg..	sl. straw..	...	none ...	.0002	.0160	...	...	.0000	.0904	...	...	...	..	..	.55	...
542	26	59°	clear ..	con. veg	sl. straw..	...	none ...	.0015	.0145	...	...	.0000	.1393	...	...	...	...	...	.55	...
633	June 10	58°	clear ..	none ..	sl. straw..	...	none ...	.0033	.0227	...	...	.0000	.0796	..	...	...	..	...	.55	...
645	14	68°	clear .	sl. veg..	sl. straw..	...	sl. marshy ...	.0013	.0067	...	...	.0000	.1389	...	...	...	...	...	.55	...
804	Aug 9	73°	v. slight	cons..	0.28	dist. veg...	dist. veg...	.0006	.0136	.0126	.0010	.0000	.0230	0.36	5.00	2.10	2.90	0.9	.54	...
847	16	72°	v. slight	cons.	0.25	dist. veg. & marshy...	dist. veg...	.0008	.0186	.0158	.0028	.0000	.0300	0.35	...	...	...	0.8	.53	...
890	23	66°	v. slight	slight ..	0.23	faintly veg...	dist. veg...	.0012	.0090	.0088	.0002	.0000	.0370	0.24	4.70	1.30	3.40	0.9	.55	...

CHEMICAL EXAMINATION OF WATER FROM WANTAGH POND; WEST INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
501	May 19	66°	sl. turb.	none .	sl. straw..	...	none ...	.0006	.0148	...	...	.0000	.0571	...	...	...	...	...	.55	...
545	26	64°	clear ..	sl. veg..	sl. straw..	...	none ...	.0002	.0128	...	...	.0000	.0245	...	...	..	...	...	.55	...
636	June 10	60°	clear .	none ..	sl. straw..	...	sl. marshy...	.0002	.0148	..	...	.0000	.0575	..	...	...	...	...	.55	...
648	14	62°	clear ..	none ..	sl. straw..	...	sl. marshy...	.0014	.0086	..	...	.0000	.0647	...	...	...	...	...	.60	...
1047	Sept 30	56°	v. slight	slight ..	0.10	v. faintly veg ...	none ...	.0022	.0044	.0044	.0000	.0000	.0450	0.13	...	...	..	0.6	.54	...

CHEMICAL EXAMINATION OF WATER FROM WANTAGH POND ; EAST BRIDGE. (Parts per 100,000.) TABLE

No.	Date of Collection	Tem.	APPEARANCE			ODOR		AMMONIA				NITROGEN AS		Oxygen Consumed	RESIDUE ON EVAPORATION			Hardness	Chlorine	Iron
			Turbidity	Sediment	Color	Cold	Hot	Free	Albuminoid Total	Albuminoid In Solution	Albuminoid In Suspension	Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
499	May 19	64°	clear	sl. veg.	sl. straw		none	.0002	.0126			.0000	.0822						.55	
543	26	63°	clear	sl. veg.	sl. straw		none	.0002	.0188			.0000	.0734						.55	
634	June 10	58°	clear	none	sl. straw		sl. marshy	.0020	.0150			0000	.0642						.55	
646	14	67°	clear	none	sl. straw		none	.0000	.0145			.0000	.0905						.55	

CHEMICAL EXAMINATION OF WATER FROM WANTAGH POND ; WEST BRIDGE. (Parts per 100,000.) TABLE

500	May 19	64°	sl. turb.	none	sl. straw		none	.0002	.0152			.0000	.0822						.55	
544	26	63°	clear	none	sl. straw		none	.0000	.0150			.0000	.0988						.55	
635	June 10	59°	clear	none	sl. straw		sl. marshy	.0017	.0243			.0000	.0562						.55	
647	14	67°	clear	sl. veg.	sl. straw		sl marshy	.0004	.0151			.0000	.1067						.50	

MICROSCOPICAL EXAMINATION OF WATER FROM WANTAGH POND; GATE HOUSE. (No. per c.c.) TABLE

Number	21	40	50	90	102	109	118	148	160	192	215	250	278	313	351	398	437	491	503	541	558	585	611	639	677	720	763	804	843	916
Date of Collection	1897 Jan 12	Jan 21	Feb 2	Mar 3	Mar 16	Mar 18	Mar 23	Apl 1	Apl 6	Apl 13	Apl 21	Apl 29	May 5	May 13	May 19	May 26	J'ne 3	J'ne 10	J'ne 14	July 8	July 12	July 19	July 26	Aug 2	Aug 9	Aug 16	Aug 23	Aug 30	Sept 13	Sept 30
Temperature										52°	47°	54°	59°	59°	62°	62°	63°	58°	66°	76°	76°	74°	72°	72°	74°	75°	72°	72°	70°	60°
Diatomaceæ	3	2		1	Lost	2	Lost	1	3	15	32	1	1		1		2		1	11	4	4	7	12	2	6	2	8	38	37
Melosira											31													8					6	
Navicula																														23
Synedra																				9									30	
Tabellaria										9																				10
Cyanophyceæ															1			1		4					1		2	3	1	
Algæ			1						1	2	2									2	1	3	4	1	8	1	1			2
Fungi									1												1							1		
Infusoria				4		4			2	6	4	1	5	3	1	1		1				4	82	15	26	14	6	8	5	
Dinobryon																							75		10					
Dinobryon Cases																							5							
Glenodinium																									6	11		5		
Monas																								10						
Vermes													1									2	2		1					
Total Organisms	3	2	1	5		6		1	7	23	38	2	7	3	3	1	2	2	1	17	6	13	95	28	38	22	11	20	45	39
Total Genera	3	2	1	2		2		1	5	7	5	2	4	1	3	1	2	2	1	7	3	6	7	9	13	8	7	9	7	7

BACTERIAL EXAMINATION OF WATER FROM WANTAGH POND; GATE HOUSE. (No. per c. c.) TABLE

Bacteria	353	126	223	170	92	...	218	160	146	282	210	175	200	340	260	220	90	135	80	...	...	600	1000	1600	500	600	400	700	1200	1200
Meteorological Statistics.																														
Rain-fall in inches week preceding	.09	2.21	.98	.c6	1.30	1.15	.81	.00	.62	1.50	1.00	.08	1.40	2.14	2.66	.95	1.64	2.16	1.73	.75	.14	4.76	3 17	2.24	1.03	.81	.23	2.00	.00	1.17
Date	Jan 16	Jan 23	Feb 6	Mar 6	Mar 20	Mar 20	Mar 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	29°	31°	27°	35°	35°	35°	42°	42°	47°	47°	46°	53°	54°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the Species tabulated above as occurring in quantities of five or more per C.C, in any one examination, the following were also found: ***Diatoms***—Cymbella, Eunotia, Epithemia, Gomphomena, Surirella, Tabellaria; ***Cyanophyceæ***—Clathrocystis, Microcystis, Oscillaria; ***Algæ***—Arthrodesmus, Closterium, Conferva. Cosmarium, Desmidium, Raphidium, Scenedesmus. Hyalotheca, Zygnema, Protococcus, Dictyosphaerium: ***Infusoria***—Cryptomonas, Euglena, Peridinium, Trachelmonas, Uroglena. Mallomonas; ***Vermes***—Anurea, Polyartha; ***Sponge spicules.***

MICROSCOPICAL EXAMINATION OF WATER FROM WANTAGH POND.

(No. per c.c.) TABLE

	East Inlet							West Inlet				
Number	347	393	487	499	676	719	762	350	396	490	502	915
Date of Collection	1897 May 19	May 26	J'ne 10	J'ne 14	Aug 9	Aug 16	Aug 23	May 19	May 26	J'ne 10	J'ne 14	Sept 30
Temperature	66°	59°	54°	65°	73°	72°	66°	66°	64°	60°	62°	56°
Diatomaceæ	3	3	10	...	23	11	13	10	20	12	11	69
Melosira	...	...	...	...	..	...	.	..	..	5	10	6
Navicula	...	..		...	15	6	...	...	..	...	...	57
Tabellaria	...		...	..	...		6	...	14	5	...	6
Cyanophyceæ	...	...	.	1	...	1	...	...	...	3	.	...
Algæ	...	...	..	...	13		3	5	5	...	...	...
Zygnema	..	...	...	...	7	...	...	...	...	..	...	...
Fungi	1	...	...	.	2	1	...	..	...	...	...	...
Infusoria	2	...	1	...	26	18	10	2	..	1	..	1
Dinobryon	...	..	...	...	11	...	..	...	...	...	..	...
Glenodinium	...	...	...	..	5	8	6	...	...	...	...	...
Monas	..	.	...	...	..	5	...	...	..	...	...	...
Vermes	...	...	1	...	...	1	..	...	..	.	...	..
Total Organisms	6	3	12	1	64	32	26	17	25	16	11	70
Total Genera	3	2	7	1	14	11	11	8	5	7	2	4

BACTERIAL EXAMINATION OF WATER FROM WANTAGH POND.

(No. per c.c.) TABLE

	East Inlet							West Inlet				
Bacteria	370	240	260	180	1000	2800	1300	340	370	1200	240	500
Meteorological Statistics												
Rain-fall in inches week preceding	2.66	.95	2.16	1.73	1.03	.81	.23	2.66	.95	2.16	1.73	1.17
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	May 22	May 29	J'ne 12	J'ne 19	Oct 2
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	60°	60°	61°	68°	60°

CHEMICAL EXAMINATION OF WATER FROM NEWBRIDGE POND; GATE HOUSE. (Parts per 100,000).

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
3	Dec 14							.0014	.0040			.0000	.0482		4.70	2.10	2.60	1.5	.60	
	1897																			
29	Jan 5							.0014	.0040			.0000	.0581						.55	
44	18							.0010	.0056			.0000	.0815		4.00	1.50	2.50		.55	
79	Feb 2							.0011	.0047			.0000	.1061						.65	
103	8							.0012	.0038			.0000	.0978						.60	
146	17							.0013	.0055			.0000	.0895						.65	
163	24							.0022	.0084			.0000	.1382						.65	
201	Mar 3							.0003	.0059			.0000	.0986		6.10	1.40	1.70	2.7	.55	
218	9							.0010	.0060			.0000	.1062						.70	
255	18							.0009	.0059			.0000	.1063						.70	
269	23							.0004	.0116			.0000	.0903						.65	
310	Apl 1							.0006	.0082			.0000	.0736						.65	
326	6							.0013	.0103			.0000	.0895		5.10	2.50	2.60		.75	
359	13							.0002	.0128			.0000	.1069						.75	
384	21							.0003	.0172			.0000	.0986						.65	
408	29				none		none	.0000	.0072			.0000	.1070						.70	
437	May 5	59°	clear	none	sl. straw		none	.0002	.0080			.0000	.0982		5.00	2.30	2.70		.70	
467	13	59°	clear	none	sl. straw		none	.0003	.0131			.0000	.1069						.70	
503	19	63°	clear	none	sl. straw		sl. marshy	.0000	.0110			.0000	.0988						.65	
547	26	63°	clear	none	sl. straw		none	.0000	.0160			.0000	.0906						.70	
585	June 3	62°	clear	none	sl. straw		none	.0007	.0098			.0000	.0982		4.90	1.40	3.50		.70	
638	10	59°	clear	none	sl. straw		none	.0002	.0278			.0000	.1151						.70	
650	14	63°	clear	none	sl. straw		none	.0000	.0145			.0000	.1071						.65	
687	July 12	76°	v. slight	slight		faintly veg														
714	19	74°	none	v. slight	1.40	dist. veg & grassy	dist. veg	.0016	.0256			.0000	.0100					0.9	0.56	
740	26	71°	none	v sligh.	1.00	dist. veg	faintly veg	.0040	.0218			.0000	.0200	0.91	6.50				0.61	
768	Aug 2	71°	v. slight	v. slight	0.80	dist. veg	dist. veg	.0012	.0184	.0166	.0018	.0000	.0230	0.87	5.70	3.20	2.50	0.9	0.59	
806	9	74°	v. slight	slight	0.55	faintly veg	dist. veg	.0006	.0130	.0114	.0016	.0000	.0200	0.59	5.40	1.40	4.00	0.8	0.64	
849	16	76°	v. slight	v. slight	0.40	faintly veg	v. faintly veg	.0012	.0144	.0144	.0000	.0000	.0270	0.43	4.80	2.90	1.90	0.6	0.66	
892	23	71°	v. slight	v. slight	0.38	faintly veg	dist. veg	.0010	.0102	.0096	.0006	.0000	.0250	0.40	5.10	2.10	3.00	0.9	0.66	
933	30	69°	none	v. slight	0.40	faintly veg	faintly veg	.0012	.0108	.0108	.0000	.0000	.0330	0.46	4.70	1.90	2.80	0.8	0.64	
977	Sept 13	70°	v. slight	v. slight	0.17	faintly veg	v. faintly veg	.0012	.0068	.0066	.0002	.0000	.0250	0.20	4.00	1.20	2.80	0.6	0.61	.0160
1051	30	54°	v. slight	v. slight	0.12	v. faintly veg	v. faintly veg	.0008	.0070	.0064	.0006	.0000	.0330	0.06	5.50	1.50	4.00	0.6	0.61	.0050

CHEMICAL EXAMINATION OF WATER FROM NEWBRIDGE POND; WEST INLET. (Parts per 100,000).

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																			
504	May 19	66°	sl. turb.	sl. veg..	sl. straw..	...	sl. marshy	.0000	.0080	...	.....	.0000	.0823	...	.....	...	....	...	.70	.....
548	26	56°	clear	sl. veg..	sl. straw..	...	none	.0000	.0075	.....	.....	.0000	.0906	....	....	...	.....	....	.75	.....
639	June 10	56°	clear ..	none ..	sl. straw..	...	sl. marshy	.0003	.0223	.....	...	.0000	.0986	...	.....		..	....	.70	.....
651	14	63°	clear ..	con. veg	sl. straw..	...	sl. marshy	.000c	.0115	.....	.....	.0000	.0988	...	.....	.....	.....	...	.75	.....
807	Aug 9	73°	v. slight	cons. ..	0.60	faintly veg	dist. veg	.0004	.0126	.0126	.0000	.0c00	.0200	0.61	5.40	2.40	3.00	0.8	.66	.....
850	16	78°	v. slight	v. slight	0.43	faintly veg	v. faintly veg	.0012	.0170	.0170	.0000	.0000	.0250	0.46	.....	.....	....	0.8	.65	.. ..
893	23	71°	v. slight	slight ..	0.38	faintly veg	dist. veg.	.0012	.0100	.0096	.0004	.0000	.0220	0.43	5.10	1.70	3.40	0.9	.66	.....
1052	Sept 30	58°	none ..	v. slight	0.12	none	v. faintly veg	.0018	.0054	.0046	0008	.0000	.0300	0.03	.. ..	. ..	. ..	0.8	.71	.....

MICROSCOPICAL EXAMINATION OF WATER FROM NEWBRIDGE POND; GATE HOUSE. (No. per c.c.) TABLE

Number	32	41	51	91	95	103	110	119	149	162	193	216	251
Date of Collection	1897 Jan 18	Jan 21	Febr 2	Mar 3	Mar 9	Mar 16	Mar 18	Ma 23	Apl 1	Apl 6	Apl 13	Apl 21	Apl 29
Temperature	...	...	...	...	...	...	...	...	...	...	58°	50°	54°
Diatomaceæ	12	5	1	2	8		...		2	4	5	7	4
Fragilaria	...	...	...	...	...		...		...	...	...	6	...
Melosira	...	...	...	...	...		...		...	...	...	...	...
Navicula	...	...	...	...	...		...		...	...	...	...	...
Synedra	...	...	...	...	...		...		...	...	...	...	...
Tabellaria	...	...	...	...	...		...		...	...	...	...	...
Cyanophyceæ	...	...	1	...	...		...		...	...	...	...	...
Clathrocystis	...	...	...	...	...	Lost	...	Lost	...	...	...	...	...
Algæ	2	...	...	4	...		2		1	...	...	5	...
Xantuldium	...	...	...	...	...		...		...	...	...	5	...
Zygnema	...	...	...	...	...		...		...	...	...	...	...
Fungi	1	...	...	...	...		...		1	1	...	1	...
Rhizopoda	...	...	...	...	...		...		...	...	...	...	...
Infusoria	...	...	...	2	...		1		...	2	...	...	1
Dinobryon	...	...	...	...	...		...		...	...	...	...	...
Dinobryon Cases	...	...	...	...	...				...	...	...	...	...
Total Organisms	15	5	2	8	8		3		4	7	5	13	5
Total Genera	5	3	2	7	3		2		3	5	1	3	3

Number	280	314	352	399	439	492	504	542	559	586	612	640	678	721	764	805	845	919
Date of Collection	May 5	May 13	May 19	May 26	June 3	June 10	June 14	July 8	July 12	July 19	July 26	Aug 2	Aug 9	Aug 16	Aug 23	Aug 30	Sept 13	Sept 30
Temperature	59°	59°	63°	63°	62°	59°	63°	77°	76°	74°	71°	71°	74°	76°	71°	69°	...	58°
Diatomaceæ	3	4	7	5	3	12	3	3	6	...	2	...	3	7	1	4		47
Fragilaria	...	...	...	...	...	...		...	...	...	...	...	...	...	...	...		...
Melosira	...	...	7	...	...	5	...	...	...	...	...	...	...	...	...	...		...
Navicula	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		36
Synedra	...	...	...	...	...	6	...	...	...	...	...	...	...	...	...	...		...
Tabellaria	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		7
Cyanophyceæ	...	...	...	1	...	36	...	...	...	...	1	...		...	...	...		...
Clathrocystis	...	...	...	...	...	36	...	...	...	...	...	...	...	...	...	...		...
Algæ	...	...	...	2	...	...	...	...	...	1	1	1	2	5	...	1	Lost	...
Xantuldium	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		...
Zygnema	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...		...
Fungi	...	...	1	...	...	...	1	...	...	...	3	1	...	...	...	...		...
Rhizopoda	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...		...
Infusoria	1	2	...	9	2	...	1	1	1	...	30	4	8	...	1	...		...
Dinobryon	...	...	...	9	...	...	...	...	...	...	15	...	...	...		...		...
Dinobryon Cases	...	...	...	...	...	...	...	...	...	...	15	...	...	...		...		...
Total Organisms	4	6	8	17	5	48	6	4	7	1	37	6	13	12	2	5		47
Total Genera	3	3	2	7	3	4	6	4	4	1	5	5	7	4	2	4		3

BACTERIAL EXAMINATION OF WATER FROM NEWBRIDGE POND; GATE HOUSE. (No. per c.c.) TABLE

Bacteria	207	147	153	160	250	290	...	290	210	400	250	140	130	190	380
Meteorological Statistics															
Rain-fall in inches week preceding	.16	2.21	.98	.06	.60	1.30	1.15	.81	.00	.62	1.50	1.00	.08	1.40	2.14
Date	Jan 23	Jan 23	Febr 6	Mar 6	Mar 13	Mar 20	Mar 20	Mar 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15
Mean temperature week ending	31°	31°	27°	35°	37°	35°	35°	42°	42°	47°	47°	46°	53°	54°	60°

Bacteria	370	210	180	170	110	..	...	70	500	240	3500	2300	80	Cont	1200	146
Meteorological Statistics																
Rain-fall in inches week preceding	2.66	.95	1.64	2.16	1.73	.75	.14	4.76	3.17	2.24	1.03	.81	.23	2.00	.00	1.17
Date	May 22	May 29	June 5	June 12	June 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the genera tabulated above, as occurring in quantities of five or more per C. C. in any one examination, the following were also found: ***Diatoms***—Asterionella, Cyclotella Eunotia, Meridion Surirella, Pleurosigma; ***Cyanophyceæ***—Clathrocystis, Oscillaria; ***Algæ***—Cosmarium, Eudorina, Protococcus, Scenedesmus; ***Infusoria***—Cryptomonas Euglena, Glenodinium Monas, Peridinium; ***Fungi***—Molds.

MICROSCOPICAL EXAMINATION OF WATER FROM NEWBRIDGE POND; INLET.

(No. per c. c.) TABLE

Number	353	400	493	505	679	722	765	920
Date of Collection	1897 May 19	May 26	J'ne 10	J'ne 14	Aug 9	Aug 16	Aug 23	Sept 30
Temperature	66°	56°	56°	63°	73°	78°	71°	51°
Diatomaceæ	1	10	10	3	22	19	9	66
Navicula	..	..	..	...	11	..	...	42
Synedra	...	...	....	..	7	6	..	12
Tabellaria	....	8	6	....	..	..	6	12
Cyanophyceæ	1	....	...	....	3	....	...	....
Algæ	...	2	1	14	21	9	3	...
Desmidium	....	...	...	14	..	...	...	...
Zygnema	...	...	....	...	20	6	..	...
Rhizopoda	...	....	..	....	..	1	....	....
Infusoria	4	...	....	....	1	15	1	...
Glenodinium	.	....	..	....	....	11	....	...
Vermes	....	....	....	...	1	.	...	..
Total Organisms	6	12	11	17	48	44	13	66
Total Genera	3	4	3	4	9	15	4	3

BACTERIAL EXAMINATION OF WATER FROM NEWBRIDGE POND; INLET.

(No. per c. c.) TABLE

Bacteria	350	335	1800	110	1200	2600	100	300
Meteorological Statistics.								
Rain-fall in inches week preceding	2.66	.95	2.16	1.73	1.03	.81	.23	1.17
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	Oct 2
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	60°

CHEMICAL EXAMINATION OF WATER FROM EAST MEADOW POND; GATE HOUSE. (Parts per 100,000).

No.	Date of Collection	Tem.	APPEARANCE: Turbidity	APPEARANCE: Sediment	APPEARANCE: Color	ODOR: Cold	ODOR: Hot	AMMONIA: Free	AMMONIA: Albuminoid: Total	AMMONIA: Albuminoid: In Solution	AMMONIA: Albuminoid: In Suspension	NITROGEN AS: Nitrites	NITROGEN AS: Nitrates	Oxygen Consumed	RESIDUE ON EVAPORATION: Total	RESIDUE ON EVAPORATION: Loss on Ignition	RESIDUE ON EVAPORATION: Fixed	Hardness	Chlorine	Iron
	1896																			
23	Dec 29							.0002	.0010			.0000	.0739		4.40	1.40	3.00		0.60	
	1897																			
30	Jan 5							.0010	.0036			.0000	.0651						0.50	
45	18							.0019	.0071			.0000	.1096		4.40	1.50	2.90		0.60	
81	Feb 2							.0022	.0040			.0000	.1464						0.55	
105	8							.0035	.0067			.0000	.1206						0.55	
148	17							.0022	.0028			.0000	.1382						0.55	
164	24							.0013	.0059			.0000	.1142						0.55	
203	Mar 3							.0011	.0051			.0000	.0979		4.30	1.30	3.00	1.6	0.60	
220	9							.0009	.0053			.0000	.1310						0.55	
257	18							.0002	.0118			.0000	.1063						0.65	
271	23							.0004	.0124			.0000	.1067						0.65	
312	Apl 1							.0002	.0096			.0000	.1316						0.60	
328	6							.0002	.0092			.0000	.0987		4.50	2.20	2.30		0.60	
360	13							.0000	.0108			.0000	.0988						0.60	
385	21							.0003	.0112			.0000	.1150						0.65	
409	29				none		none	.0000	.0078			.0000	.1153						0.65	
438	May 5	60°	clear	none	sl. straw		none	.0000	.0098			.0000	.1153		3.80	2.20	1.60		0.65	
468	13	60°	clear	none	sl. straw		none	.0002	.0090			.0000	.0986						0.65	
506	19	63°	sl. turb.	none	sl. straw		none	.0000	.0105			.0000	.0823						0.70	
550	26	63°	clear	none	sl. straw		none	.0000	.0150			.0000	.0988						0.60	
587	J'ne 3	64°	clear	none	md. straw		none	.0002	.0083			.0000	.0986		4.70	2.70	2.00		0.60	
641	10	59°	clear	none	sl. straw		sl. marshy	.0000	.0240			.0000	.1070						0.65	
653	14	68°	clear	none	sl. straw		sl. marshy	.0000	.0230			.0000	.1153						0.65	
688	July 14	78°	v. slight	slight		dist. veg														
715	19	75°	v. slight	v. slight	0.65	dist. veg & grassy	dist. veg and grassy	.0008	.0218			.0000	.0170						0.56	
741	26	73°	v. slight	v. slight	0.75	dist. veg & unpleasant	faintly veg	.0036	.0264			.0000	.0300	0.74	5.50				0.56	
769	Aug 2	74°	v. slight	v. slight	0.60	dist. veg	dist. veg	.0028	.0224	.0200	.0024	.0000	.0330	0.64	5.00	2.70	2.30	0.8	0.71	
809	9	75°	v. slight	v. slight	0.40	v. faintly veg	dist. veg	.0006	.0126	.0124	.0002	.0000	.0250	0.45	5.00	2.00	3.00	0.9	0.60	
852	16		v. slight	v. slight	0.43	dist. veg & marshy	faintly veg	.0020	.0166	.0164	.0002	.0001	.0250	0.38	4.90	2.90	2.00	0.6	0.59	
895	23	72°	v. slight	v. slight	0.47	faintly veg	dist. veg & unpleasant	.0010	.0152	.0138	.0024	.0000	.0250	0.40	5.10	2.20	2.90	0.8	0.64	
934	30	70°	none	v. slight	0.55	faintly veg & disag'ble	faintly veg	.0018	.0164	.0164	.0000	.0000	.0250	0.50	4.70	1.90	2.80	0.8	0.63	
979	Sept 13	69°	v. slight	v. slight	0.23	faintly veg	faintly veg	.0022	.0108	.0102	.0006	.0000	.0270	0.22	3.80	1.20	2.60	0.5	0.59	.0200
1055	30	60°	none	v. slight	0.15	v. faintly veg	v. faintly veg	.0018	.0100	.0088	.0012	.0001	.0350	0.08	4.80	1.30	3.50	0.6	0.59	.0100

CHEMICAL EXAMINATION OF WATER FROM EAST MEADOW POND; INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
505	May 19	64°	sl. turb.	none...	sl. straw..	......	sl. marshy..	.0003	.0097	...	...	.0000	.1144	...	....	...	...	.	.70	...
549	" 26	62°	clear..	sl. veg..	sl. straw..	......	none	.0007	.0183	. .	....	.0000	.1147	...	...	...	...	...	.65	.....
640	June 10	60°	clear...	none...	sl. straw .	......	none	.0013	.0292	...	.....	.0000	.0978	....	.....	.....	....	...	.60	...
652	" 14	64°	clear...	sl. veg..	sl. straw..	......	sl. marshy......	.0021	.0199	...	....	.0000	.1383	...	.....	...	...	....	.65	....
808	Aug 9	64°	v. slight	slight..	0.20	faintly veg. & unpleas't	dist. veg......	.0028	.0116	.0070	.0046	.0000	.0250	0.21	5.30	2.20	3.10	0.6	.61	.....
851	" 16	70°	v. slight	cons...	0.30	dist. veg.	v. faintly veg.	.0014	.0148	.0142	.0006	.0000	.0200	0.32	.....	...	...	1.1	.59	.....
894	" 23	65°	v. slight	slight..	0.22	faintly veg...... ..	dist veg. & unpleasant	.0012	.0082	.0078	.0004	.0000	.0330	0.16	4.90	1.40	3.50	0.8	.60	....
1054	Sept. 30	60°	v. slight	slight..	0.12	v. faintly veg......	v. faintly veg	.0024	.0076	.0076	.0000	.0000	.0350	0.05	.....	...	...	0.9	.61	.....

MICROSCOPICAL EXAMINATION OF WATER FROM EAST MEADOW POND; GATE HOUSE. (No. per c. c.) TABLE

Number	33	96	120	150	194	217	252	281	315	355	402	441	495	507	543	560	587	613	641	681	724	767	806	847	923
Date of Collection	1897 Jan 18	Mch 9	Mch 23	Apl 1	Apl 13	Apl 21	Apl 29	May 5	May 13	May 19	May 26	J'ne 3	J'ne 10	J'ne 14	July 8	July 12	July 19	July 26	Aug 2	Aug 9	Aug 16	Aug 23	Aug 30	Sept 13	Sept 30
Temperature	...	...	...	...	53°	50°	53°	60°	60°	64°	63°	64°	...	68°	78°	78°	75°	73°	74°	75°	...	72°	70°	69°	60°
Diatomaceæ	35	13	13	14	5	11	15	23	9	10	7	3		1	3		...		...	6	4	2	...	3	95
Melosira	...	...	...	...	...	...	...	5	...	...	...	...		...	...		...		...	...	...	...	...	...	...
Navicula	...	..	...		...	...	...	...	...	...	...	...		...	...		...		...	...	...	...	...	...	77
Synedra	...	..	...	...	..	...	..	...	...	...	...	...		...	...		...		...	..	...	...	..	...	16
Tabellaria	..	..	...	...	...	..	8	16	5	6	..	...		...	...		...		..	6	...	...	...	...	...
Cyanophyceæ	...	..	..	1	...	1	...	...	...	1	...	1	Lost	...	...	Lost	...	Lost	...	...	...	...	...	...	...
Algæ	66	1	4	1	1	...	1	1	2	...	1	...		...	...		1		..	...	...	...	...	..	...
Fungi	3	..	..	...	...	...	...	...	...	...	1	...		1	...		..		...	...	1	..	...	...	...
Infusoria	5	...	2	1	10	...	...	27	...	2	2	1		..	8		5		1	1	1	...	4	15	5
Dinobryon Cases	...	...	...	...	10	...	...	9	...	...	...	.		...	8		...		...	...	..	...	...	7	...
Dinobryon	...	.	...	...	..	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	6	...
Monas	...	...	...	..	...	...	...	18	...	...	...	...	...	...		...	...	..	...	...	...	...	..	...	...
Vermes	...	...	...	...	...	...	...	...	...	..	...	...		...	...		...		...	...	...	1	...	...	...
Total Organisms	109	14	19	17	16	12	16	51	11	13	11	5		2	11		6		1	7	6	3	4	18	10
Total Genera	9	4	3	4	4	5	5	7	7	7	9	4		2	4		3		1	2	5	3	3	4	5

BACTERIAL EXAMINATION OF WATER FROM EAST MEADOW POND; GATE HOUSE. (No. per c. c.) TABLE

Bacteria	324	...	220	177	180	95	196	210	225	115	160	190	450	170	...	...	900	600	1800	1900	1600	2100	800	300	155
Meteorological Statistics.																									
Rain-fall in inches for week preceding	.16	.60	.81	.00	1.50	1.00	.08	1.40	2.14	2.66	.95	1.64	2.16	1.73	.75	.14	4.76	3.17	2.24	1.03	.81	.23	2.00	.00	1.17
Date	Jan 3	Mch 13	Mch 27	Apl 3	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature for week ending	31°	37°	42°	42°	47°	46°	53°	54°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the organisms tabulated above as occurring in quantities of five or more per C. C. in any one examination, the following were also present: ***Diatoms***—Cymbella, Meridion, Nitzschia, Pleurosigma, Eunotia; ***Cyanophyceæ***—Clathrocystis Oscillaria; ***Algæ***—Closterium, Protococcus, Staurastrum, Xanthidium, Zygnema; ***Infusoria***—Euglena, Glenodinium, Peridinium; ***Vermes***—Rotifer.

MICROSCOPICAL EXAMINATION OF WATER FROM EAST MEADOW POND; INLET.

(No. per c. c.) TABLE

Number	354	401	494	506	680	723	766	922
Date of Collection	1897 May 19	May 26	J'ne 10	J'ne 14	Aug 9	Aug 16	Aug 23	Sept 30
Temperature	64°	62°	60°	64°	66°	70°	65°	
Diatomaceae	35	19	32	2	1	4	2	93
Navicula	....	....	..	..	...	....	.	72
Tabellaria	27	17	22	...	..	..	..	21
Algae	2	10	2	1	...	1	....	4
Raphidium		6	....	....	....	...	...	....
Rhizopoda	..	...	1	..	...	...	..	...
Infusoria	....	2	...	....	..	2	1	1
Total Organisms	37	31	35	3	1	7	3	98
Total Genera	5	8	8	3	1	5	3	4

BACTERIAL EXAMINATION OF WATER FROM EAST MEADOW POND; INLET. TABLE

Bacteria	140	230	320	270	300	3600	600	1900
Meteorological Statistics.								
Rain-fall in inches week preceding	2.66	.95	2.16	1.73	1.03	.81	.23	1.17
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	Oct 2
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	60°

CHEMICAL EXAMINATION OF WATER FROM MILLBURN POND; GATE HOUSE. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
26	Dec 29	...	...	...	...	...	...	.0006	.0014	...	...	.0000	.1477	...	5.40	1.50	3.90	...	.75	...
	1897																			
32	Jan 5	...	...	...	...	...	...	.0004	.0074	...	...	.0000	.1479	...	...	...	...	...	.75	...
46	18	...	...	...	...	...	...	.0012	.0096	...	...	.0000	.1719	...	4.90	2.60	2.30	...	.80	...
68	Feb 1	...	...	...	...	...	...	.0014	.0036	...	...	.0000	.2047	...	...	...	...	...	.70	...
119	10	...	...	...	...	...	...	.0013	.0063	...	...	.0000	.1883	...	...	...	...	...	.70	...
125	15	...	...	...	...	...	...	.0004	.0024	...	...	.0000	.1808	...	...	...	...	...	.85	...
153	23	...	...	...	...	...	...	.0018	.0086	...	...	.0000	.1079	...	...	...	...	...	.75	...
205	Mar 3	...	...	...	...	...	...	.0004	.0128	...	...	.0000	.1726	...	7.20	3.80	4.40	...	.80	...
222	9	...	...	...	...	...	...	.0010	.0056	...	...	.0000	.1733	...	...	...	...	...	.65	...
235	15	...	...	...	...	...	...	.0005	.0050	...	...	.0000	.1724	...	...	...	...	...	.70	...
259	22	...	...	...	...	...	...	.0004	.0062	...	...	.0000	.2056	...	...	...	...	...	.85	...
289	30	...	...	...	...	...	...	.0004	.0066	...	...	.0000	.2279	...	...	...	...	...	.70	...
330	Apl 6	...	...	...	...	...	...	.0002	.0108	...	...	.0000	.1398	...	5.70	2.90	2.80	...	.65	...
350	12	...	...	...	...	...	...	.0000	.0086	...	...	.0000	.1646	...	...	...	...	...	.75	...
375	20	...	...	...	...	...	...	.0000	.0070	...	...	.0000	.1647	...	...	...	...	...	.70	...
399	28	...	...	...	none ...	...	none ...	.0000	.0078	...	...	.0000	.1729	...	...	...	...	...	.70	...
427	May 4	52°	sl. turb	con. veg	sl. straw	...	sl. marshy ...	.0022	.0158	...	...	.0000	.1464	...	9.00	4.00	5.00	...	.75	...
458	12	56°	sl. turb	none .	sl. straw .	...	none. ...	.0004	.0060	...	...	.0000	.1397	...	...	...	...	...	.75	...
483	18	62°	clear ..	none ..	normal...	...	none ...	.0000	.0106	...	...	.0000	.1318	...	...	...	...	...	.75	...
527	25	63°	clear ..	none ..	normal...	...	none ...	.0000	.0086	...	...	.0000	.1153	...	...	...	...	...	.75	...
574	June 2	56°	clear ..	none	sl. straw .	...	sl. marshy...	.0004	.0082	...	...	.0000	.1808	...	10.30	6.40	3.90	...	.80	...
607	8	55°	clear ..	none ..	normal...	...	sl. marshy...	.0011	.0069	...	...	.0000	.1803	...	...	...	...	...	.75	...
655	15	65°	clear ..	none ..	normal...	...	sl. marshy ...	.0000	.0118	...	...	.0000	.1482	...	...	...	...	...	.75	...
690	July 12	70°	v. slight	slight ..	...	dist. veg...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
705	16	73°	v. slight	v slight	...	dist. veg...	dist. veg...	.0022	.0334	...	...	.0000	...	...	...	...	...	...	0.66	...
717	19	70°	v. slight	v. slight	0.75	dist. veg...	dist. veg...	.0014	.0202	...	...	.0000	.0570	...	...	...	...	...	0.69	...
743	26	66°	v. slight	v. slight	0.50	dist. veg...	faintly veg...	.0012	.0154	...	...	.0000	.0650	0.58	4.70	...	...	...	0.71	...
771	Aug 2	65°	v. slight	v. slight	0.30	dist. veg...	dist. veg. ...	.0008	.0112	.0112	.0000	.0000	.0400	0.32	6.10	2.60	3.50	1.1	0.73	...
811	9	75°	v. slight	v. slight	0.30	faintly veg...	dist. veg...	.0004	.0106	.0106	.0000	.0001	.0530	0.36	6.40	2.50	3.90	1.4	0.73	...
854	16	...	v. slight	v. slight	0.23	faintly veg...	v. faintly veg ...	.0018	.0142	.0114	.0028	.0002	.0530	0.32	6.80	4.10	2.70	1.1	0.71	...
897	23	69°	none ..	v. slight	0.20	v. faintly veg...	faintly veg...	.0010	.0112	.0068	.0044	.0001	.0600	0.23	6.10	2.30	3.80	1.3	0.73	...
936	30	73°	none ..	v. slight	0.25	faintly veg...	faintly veg...	.0012	.0128	.0120	.0008	.0005	.0530	0.29	5.50	2.20	3.30	1.6	0.74	...
981	Sept 13	69°	v. slight	cons. ..	0.14	dist. veg. & unpleasant	dist. veg. & unpleasant	.0012	.0138	.0102	.0036	.0003	.0670	0.17	5.60	1.40	4.20	0.9	0.71	00070
1057	30	63°	none ..	v. slight	0.12	v. faintly veg...	v. faintly veg. ...	.0024	.0136	.0112	.0024	.0003	.0650	0.13	5.90	2.10	3.80	1.3	0.73	00050

CHEMICAL EXAMINATION OF WATER FROM MILLBURN POND ; INLET. (Parts per 100,000.) TABLE

No.	Date of Collection	Tem.	Appearance			Odor		Ammonia				Nitrogen as		Oxygen Consumed	Residue on Evaporation			Hardness	Chlorine	Iron
			Turbidity	Sediment	Color	Cold	Hot	Free	Albuminoid			Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
									Total	In Solution	In Suspension									
	1897																			
484	May 18	75°	sl. turb.	none...	sl. straw .	....	none	.0000	.0062	.....	.....	.0000	.1565	....	.....	...	..	..	.80	.....
528	25	60°	sl. turb.	none...	normal ...	....	sl, marshy	...	.0054	....	.....	.0000	.1482	....	. ...	....	....	. .	.75	.....
608	June 8	54°	clear...	none...	normal...	....	sl. marshy.....	.0011	.0063	.....	....	.0000	.1638	..	.....	...	....	..	.75	.....
656	15	54°	clear...	sl. veg.	normal...	....	sl. veg.	.0015	.0205	.....	....	.0000	.1476	...	.....	....	....	...	.70	.....
812	Aug. 9	58°	none...	v. slight	0.18	faintly veg.....	faintly veg...........	.0010	.0062	.0062	.0000	.0000	.0570	0.23	6.10	2.60	3.50	1.4	.73	.....
855	16	....	v. slight	v. slight	0.35	faintly veg...	v. faintly veg	.00.6	.0108	.0108	.0000	.0000	.5.00	0.42	6.10	3.50	2.60	1.1	.72	.....
898	23	59°	none...	v. slight	0.17	v. f'tly veg. & unpleas't	faintly veg.	.0010	.0034	.0034	.0000	.0000	.0650	0.18	.....	...	...	1.3	.71	. ...
1058	Sept. 30	54°	v. slight	slight..	0.17	v. faintly veg.......	v. faintly veg..... ..	.0026	.0072	.0068	.0004	.0000	.0900	0.02	6.20	1.70	4.50	1.6	.73	.0070

CHEMICAL EXAMINATION OF WATER FROM MILLBURN PUMPING STATION; TAP. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
25	1896 Dec 29	...	...	...	...	...	...	.0002	.0000	...	...	.0000	.1645	...	5.40	1.50	3.90	2.0	1.10	...
31	1897 Jan 5	...	...	...	...	...	...	.0000	.0008	...	...	.0000	.0576	...	...	...	...	...	0.50	...
47	18	...	...	...	...	...	...	.0006	.0036	...	...	.0000	.0819	...	5.00	2.40	2.60	...	0.85	...
69	Feb 1	...	...	...	...	...	...	.0010	.0020	...	...	.0000	.0980	...	...	...	...	...	0.75	...
118	10	...	...	...	...	...	...	.0012	.0036	...	...	.0000	.1390	...	...	...	...	...	0.75	...
124	15	...	...	...	...	...	...	.0003	.0021	...	...	.0000	.0986	...	...	...	...	...	0.80	...
152	23	...	...	...	...	...	...	.0006	.0030	...	...	.0000	.0983	...	...	...	...	...	0.70	...
204	Mch 3	...	...	...	...	...	...	.0002	.0036	...	...	.0000	.0987	...	5.90	2.50	3.40	1.9	0.60	...
221	9	...	...	...	...	...	...	.0006	.0036	...	...	.0000	.1571	...	...	...	...	...	0.65	...
234	15	...	...	...	...	...	...	.0000	.0032	...	...	.0000	.1341	...	...	...	...	...	0.60	...
258	22	...	...	...	...	...	...	.0000	.0026	...	...	.0000	.2223	...	...	...	...	...	0.65	...
288	30	...	...	...	...	...	...	.0002	.0050	...	...	.0000	.1317	...	...	...	...	...	0.65	...
329	Apl 6	...	...	...	...	...	...	.0002	.0060	...	...	.0000	.1069	...	4.80	2.10	2.70	...	0.70	...
367	14	...	...	...	...	...	...	.0004	.0066	...	...	.0000	.1149	...	...	...	...	...	0.65	...
374	20	...	...	...	...	...	...	.0000	.0114	...	...	.0000	.0906	...	...	...	...	...	0.65	...
398	28	...	...	...	none....	...	none ...	.0000	.0046	...	...	.0000	.1482	...	...	...	...	...	0.60	...
426	May 4	54°	clear...	sl. veg.	normal...	...	sl. marshy...	.0000	.0098	...	...	.0000	.0988	...	5.40	3.10	2.30	...	0.65	...
457	12	56°	clear...	none..	sl. straw..	...	none....	.0000	.0068	...	...	.0000	.1400	...	...	...	...	...	0.65	...
482	18	60°	clear...	none...	normal...	...	sl. marshy. ...	.0000	.0090	...	...	.0000	.0988	...	...	...	...	...	0.70	...
526	25	58°	clear...	none...	normal...	...	none ...	.0000	.0072	...	...	.0000	.1659	...	...	...	...	...	0.65	...
573	June 2	53°	clear...	none...	sl. straw..	...	sl. marshy. ...	.0000	.0056	...	...	.0000	.1647	...	5.90	3.30	2.60	...	0.65	...
606	8	58°	clear...	none...	normal...	...	sl. marshy. ...	.0000	.0092	...	...	.0000	.1070	...	...	...	...	...	0.65	...
654	15	60°	clear...	none...	sl. straw..	...	sl. marshy....	.0000	.0108	...	...	.0000	.1235	...	...	...	...	...	0.65	...
689	July 12	63°	v. slight	v. slight	...	dist. veg ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
704	16	70°	v. slight	v. slight	...	dist. veg. ...	dist. veg ...	.0010	.0242	...	...	.0000	...	...	...	...	...	...	0.59	...
716	19	68°	v. slight	v. slight	0.75	dist. veg & grassy...	dist. veg ...	.0028	.0224	...	...	.0000	.0230	...	...	...	...	...	0.59	...
742	26	65°	v. slight	v. slight	0.70	dist. veg...	faintly veg...	.0016	.0170	...	...	.0000	.0370	0.68	6.40	...	...	...	0.59	...
770	Aug 2	64°	v. slight	v slight	0.70	dist. veg ...	faintly veg...	.0010	.0144	.0144	.0000	.0000	.0330	0.68	5.40	2.70	2.70	0.9	0.61	...
810	9	65°	v. slight	v. slight	0.35	faintly veg...	dist. veg ...	.0002	.0074	.0074	.0000	.0000	.0450	0.34	4.40	2.10	3.30	1.1	0.65	...
853	16	...	v. slight	v. slight	0.30	faintly veg...	v. faintly veg ...	.0028	.0126	.0126	.0000	.0000	.0400	0.31	5.00	2.80	2.20	1.1	0.66	...
896	23	65°	none...	v. slight	0.23	faintly veg...	faintly veg ...	.0018	.0138	.0090	.0048	.0000	.0450	0.25	5.20	1.90	3.30	1.1	0.66	...
935	30	70°	v. slight	v. slight	0.27	faintly veg & marshy..	v. faintly veg.. ...	.0012	.0100	.0100	.0000	.0001	.0500	0.28	4.80	1.80	3.00	1.3	0.69	...
980	Sept 13	61°	v. slight	slight..	0.12	v. faintly veg....	v. faintly veg....	.0020	.0074	.0068	.0006	.0000	.0400	0.13	4.90	0.90	4.00	0.8	0.62	.0070
1056	30	59°	none...	slight..	0.12	v. faintly earthy....	v. faintly veg....	.0012	.0060	.0058	.0002	.0000	.0450	0.04	5.40	1.40	4.00	0.9	0.59	.0050

MICROSCOPICAL EXAMINATION OF WATER FROM MILLBURN POND; GATE HOUSE.

TABLE

Number	23	65	67	98	112	134	166	184	207	242	270	305	332	378	428	461	509	545	562	577	615	643	683	726	769	808	849	925
Date of Collection	1897 Jan 13	Feb 10	Feb 15	Mch 15	Mch 22	Mch 30	Apl 6	Apl 12	Apl 20	Apl 28	May 4	May 12	May 18	May 25	J'ne 2	J'ne 8	J'ne 15	July 8	July 12	July 19	July 26	Aug 2	Aug 9	Aug 16	Aug 23	Aug 30	Sept 13	Sept 30
Temperature	....		....	....	....	....	....	....	....	51°	52°	56°	62°	64°	56°	55°	65°	75°	70°		66°	65°	75°		69°	73°	69°	63°
Diatomaceæ	28		6	14	17	3	....	16	14	8	121	....	2	2	10	9	9	7	3		9	4	8	3	....	3	4	134
Eunotia	..		....	..	8	....	..	....	....	....	66	...	...	...	...	..	...	...	...		....	...	....	....	...	....	....	....
Melosira	...		....	..	...	...	...	8	10	.	24	...	....	....	...	....	....	....	....		...	...	....	....	...	...	..	....
Navicula	....		.	....	....	....	.. .	....	...	...	....	...	...	....	6	....	...	...	...		7	...	....	..	....	....	....	108
Synedra	...		....	...	..	...	...	7	....	...	....	....	...	....	...	5	.	....	...		....	....	...	....	..	....	....	..
Tabellaria	...		....	10	6	....	...	...	....	...	21		....	..	....	....	7	...	..		....	. .	8	....	..	....	....	26
Cyanophyceæ	..		....	....	1	1	....	...	....		..	1	...	....	1	....	...	1	...		..	2	1	....	....	....		....
Algæ	...		...	..	14	....	1	....	....	1	2	....	....	...	1	....	..	....	1		1	....	...	2	....	1		....
Ulothrix	..		..	....	13	....	..	....	....	....	....	....	....	..	..	...	..	....	....		....	..	...	...	....	....	....	..
Fungi	....	Lost	..	4	5	..	....	....	3	1	1	..	....	....	1	..	1	....	...	Lost	...	....	....	....	....	....	....	....
Infusoria	....		2	..	2	6	2	....	1	..	....	...	6	32	6	....	3	....	..		31	3	8	16	1	14	9	4
Dinobryon	..		..	...	....	6	....	...	...	..	....	....	..	15	...	....	...	..	....		13	.. .	....	...	...	....	...	...
Dinobryon Cases	..		....	....	..	....	....	...	...	....	....	....	....	15	..	..	...	....	....		....	....	...	....	...	..	5	...
Glenodinium	....		....	....	...	....	....	...	..	..	..	...	..	....	..	..	....	....	..		....	...	6	12	...	12	...	
Monas	...		....	..	...	....	....	...	.	.	..	...	.. .	....	....	....	....	....	....		7	..	..	....	....	....	....	....
Peridinium	....		....	...	...	...	....	...	..	....	....	..	....	..	....	....	...	....	....		7	....	...	..	...	....	...	...
Vermes	..		..	...	1	...	...	..	....	1	....	....	...	....	....	....	...	..	...		....	....	1	....	....	....	....	..
Total Organisms	28		8	18	40	10	3	16	19	11	124	1	8	34	19	9	13	8	4		41	9	18	21	1	18	13	138
Total Genera	3		5	6	10	4	2	3	5	7	9	1	2	4	9	3	6	5	4		8	5	5	6	1	6	5	5

BACTERIAL EXAMINATION OF WATER FROM MILLBURN POND; GATE HOUSE.

TABLE

Bacteria	282	381	360	360	cont	310	400	800	180	195	2100	500	700	210	220	Lost	150	....	....	3000	1400	1200	1100	500	500	800	500	270
Meteorological Statistics.																												
Rain-fall in inches week preceding	.00	.82	1.11	1.30	.76	.59	.62	1.84	1.00	.08	1.40	.35	2.81	.95	1.64	.54	1.73	.75	.14	4.76	3.17	2.24	1.03	.81	.23	2.00	.00	1.17
Date	Jan 16	Feb 13	Feb 20	Mch 20	Mch 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	29°	33°	34°	35°	42°	42°	47°	47°	46°	53°	54°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the forms tabulated above as occurring in quantities of five or more per C.C, in any one sample, the following were also found: ***Diatoms***—Asterionella, Cyclotella, Cymbella, Diatoma Epithemia, Meridion, Surirella, Stauroneis. ***Cyanophyceæ***—Clathrocystis, Microcystis, Nostoc, Oscillaria. ***Algæ***—Closterium, Cosmarium, Dictyosphærium, Euastum, Raphidium, Scenedesmus, Zygnema. ***Infusoria***—Cryptomonas, Euglena, Peridinium, Synura. ***Vermes***—Anguillula, Anurea, Crenothrix. ***Sponge spicules.***

MICROSCOPICAL EXAMINATION OF WATER FROM MILLBURN POND; INLET.

(No. per c.c.) TABLE

Number	333	379	462	510	684	727	770	926
Date of Collection	1897 May 18	May 25	J'ne 8	J'ne 15	Aug 9	Aug 16	Aug 23	Sept 30
Temperature	57°	60°	54°	54°	58°	....	59°	54°
Diatomaceæ	9	14	7	2	. ..	2	3	100
Eunotia	5	....	...	....	....	..	....	....
Melosira	....	6	...	...	....	....	....	...
Navicula	....	...	....	...	..	..	...	62
Tabellaria	....	....	6	....	..	...	....	28
Cyanophyceæ	1	....	...	. ..	....	....	...	....
Algæ	1	2	....	...	...	...	2	....
Fungi	....	...	....	....	1	...	...	...
Infusoria	...	...	....	....	....	1	2	..
Total Organisms	11	16	7	2	1	3	7	100
Total Genera	6	6	2	1	1	2	3	6

BACTERIAL EXAMINATION OF WATER FROM MILLBURN POND; INLET.

(No. per c.c.) TABLE

Bacteria	5000	540	2000	800	1700	4800	1100	230
Meteorological Statistics								
Rain-fall in inches week preceding	2.81	.95	.54	1.93	1.03	.81	.23	1.17
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	Oct 2
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	60°

MICROSCOPICAL EXAMINATION OF WATER FROM MILLBURN PUMPING STATION; TAP. (No. per c. c.) TABLE

Number	12	22	29	45	58	64	97	111	121	151	165	183	206	240	269	282	304
Date of Collection	1896 Dec 29	1897 Jan 12	Jan 15	Feb 1	Feb 5	Feb 10	Mar 9	Mar 22	Mar 23	Apl 1	Apl 6	Apl 12	Apl 20	Apl 28	May 4	May 5	May 12
Temperature	....	....	....	....	....	....	....	....	....	....	....	....	....	54°	54°	58°	56°
Diatomaceæ	....	3	9	18	1	1	14	2	..	3	1	5	46	2	6	7	2
Asterionella													6				
Melosira													8				
Navicula																	
Synedra													25				
Tabellaria							8										
Cyanophyceæ												2	1			1	
Algæ			1						2							1	
Fungi				3								1	1				1
Infusoria												2		1		2	1
Dinobryon																	
Dinobryon Cases																	
Glenodinium																	
Vermes			1														
Total Organisms	...	3	11	21	1	1	14	2	2	3	1	10	48	3	6	11	4
Total Genera	0	1	4	6	1	1	5	1	2	1	1	7	9	2	3	8	4

Number	331	377	427	460	508	544	561	588	614	642	682	725	768	807	848	924
Date of Collection	May 18	May 25	June 2	June 8	June 15	July 8	July 12	July 19	July 26	Aug 2	Aug 9	Aug 16	Aug 23	Aug 30	Sept 13	Sept 30
Temperature	60°	58°	53°	58°	60°	65°	63°	68°	69°	64°	65°	...	68°	77°	61°	60°
Diatomaceæ	...	17	9	3	7	7	4	3	1	4	5	3	1	13	1	104
Asterionella																
Melosira						6										
Navicula														11		63
Synedra																
Tabellaria											5					38
Cyanophyceæ								1						1		
Algæ							1					2	2		1	
Fungi					1				1	1			1			
Infusoria	1	6	10	42	3	9	4		6	4	5	4	53	7	3	2
Dinobryon			5	8		5										
Dinobryon Cases			5	33												
Glenodinium													53	7		
Vermes												1				
Total Organisms	1	23	19	45	11	16	9	4	8	9	10	10	57	21	5	106
Total Genera	1	9	8	4	5	3	3	3	5	3	3	7	4	5	4	4

BACTERIAL EXAMINATION OF WATER FROM MILLBURN PUMPING STATION; TAP. (No. per c. c.) TABLE

Bacteria	28	127	103	76	76	198	110	263	177	46	240	250	230	190	405	135	175
Meteorological Statistics.																	
Rain-fall in inches week preceding	.50	.09	.03	.98	.32	.82	.60	.76	.81	.00	.62	1.84	1.00	.08	1.40	1.40	.35
Date	Jan 2	Jan 16	Jan 16	Feb 6	Feb 6	Feb 13	Mar 13	Mar 27	Mar 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 8	May 15
Mean temperature week ending	29°	29°	29°	27°	27°	33°	37°	42°	42°	42°	47°	47°	46°	53°	54°	54°	60°

Bacteria	540	240	130	110	85	...	...	200	500	400	Lost	400	1700	1000	600	75
Meteorological Statistics.																
Rain-fall in inches week preceding	2.81	.95	1.64	.54	1.73	75	.14	4.26	3.17	2.24	1.03	.81	.23	2.00	.00	1.17
Date	May 22	May 29	June 5	June 12	June 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

CHEMICAL EXAMINATION OF WATER FROM HEMPSTEAD STORAGE RESERVOIR; GATE HOUSE. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid Total	Albuminoid In Solution	Albuminoid In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Loss on Ignition	Fixed	Hardness	Chlorine	Iron
	1896																			
8	Dec 16							.0006	.0090			.0000	.1398		5.50	2.80	2.70		.70	
	1897																			
39	Jan 7							.0004	.0040			.0000	.1726						.70	
54	20							.0008	.0046			.0000	.1805		5.60	3.10	2.50		.65	
70	Feb 1							.0016	.0048			.0000	.2210						.70	
120	10							.0014	.0072			.0000	.1888						.60	
126	15							.0004	.0044			.0000	.1808						.80	
154	23							.0000	.0060			.0000	.1812						.65	
183	Mar 1							.0002	.0086			.0000	.1480		5.50	3.30	2.20		.60	
213	8							.0002	.0090			.0002	.1643						.60	
236	15							.0000	.0070			.0000	.1812						.55	
260	22							.0010	.0054			.0004	.1635						.65	
290	30							.0002	.0064			.0000	.2304						.65	
321	Apl 5							.0000	.0092			.0014	.1715		7.00	4.10	2.90		.60	
351	12							.0000	.0128			.0000	.1894						.70	
376	20							.0010	.0272			.0006	.1797						.65	
400	28				none		none	.0000	.0150			.0004	.2137						.65	
428	May 4	58°	sl. turb.	sl. veg.	sl. straw		sl. marshy	.0003	.0262			.0004	.1887		6.10	2.50	3.60		.65	
459	12	60°	sl. turb.	none	sl. straw		none	.0002	.0253			.0006	.1392						.70	
486	18	65°	sl. turb.	none	normal		sl. marshy	.0009	.0241			.0000	.1639						.70	
530	25	64°	sl. turb.	none	sl. straw		none	.0010	.0145			.0006	.1386						.75	
575	June 2	64°	clear	none	sl. straw		none	.0013	.0242			.0004	.1715		7.20	3.80	3.40		.65	
610	8	65°	sl. turb.	none	normal		none	.0022	.0188			.0004	.1625						.75	
658	15	69°	clear	none	normal		md. veg.	.0015	.0210			.0004	.1466						.75	
706	July 16	80°	v. slight	v. slight		dist. veg	dist. veg	.0004	.0204			.0002							0.68	
718	20	78°	v. slight	slight	0.03	dist. veg	dist. veg	.0006	.0158			.0007	.0500						0.61	
744	27	73°	v. slight	cons.	0.05	dist. veg. & grassy	decid. veg	.0058	.0220			.0002	.0370	0.15	5.70				0.64	
772	Aug 2	75°	v. slight	slight	0.10	dist. veg	dist. veg	.0012	.0190	.0176	.0014	.0005	.0400	0.14	5.90	2.70	3.20	1.1	0.64	
814	10	77°	v. slight	slight	0.09	faintly veg	dist. veg. & grassy	.0012	.0150	.0116	.0034	.0003	.0370	0.10	5.20	1.70	3.50	1.3	0.69	
857	17		v. slight	cons.	0.08	dist. veg	dist. veg. & earthy	.0006	.0178	.0124	.0054	.0005	.0370	0.13	4.90	1.40	3.50	0.9	0.68	
900	24	75°	v. slight	cons.	0.05	dist. veg	dist. veg. & earthy	.0020	.0134	.0096	.0038	.0006	.0270	0.11	5.80	1.60	4.20	1.3	0.69	
937	30	74°	v. slight	slight	0.10	faintly veg. & mouldy	faintly veg. & mouldy	.0012	.0144	.0128	.0016	.0007	.0400	0.12	4.20	1.30	2.90	1.3	0.69	
982	Sept 14	74°	v. slight	slight	0.10	faintly veg	dist. veg	.0012	.0178	.0134	.0044	.0006	.0330	0.14	4.60	1.00	3.60	1.6	0.73	.0050
1042	29	63°	v. slight	cons.	0.03	faintly veg	faintly veg	.0018	.0146	.0130	.0016	.0001	.0400	0.06	6.10	2.20	3.90	1.1	0.68	.0000

CHEMICAL EXAMINATION OF WATER FROM HEMPSTEAD STORAGE RESERVOIR; INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	APPEARANCE			ODOR		AMMONIA				NITROGEN AS		Oxygen Consumed	RESIDUE ON EVAPORATION			Hardness	Chlorine	Iron
									ALBUMINOID											
			Turbidity	Sediment	Color	Cold	Hot	Free	Total	In Solution	In Suspension	Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
485	May 18	60°	sl. turb.	cons. veg.	normal...	....	none	.0515	.0155	....	....	.0022	.2513	....	...	...	...	...	1.55	...
529	25	58°	sl. turb.	none ..	sl. straw..	....	vegetabie.....	0115	.0205	.. .	.....	.0008	.1709	....	...	...	....	..	1.00	.....
609	June 8	54°	sl turb.	none...	normal...	....	none...	.0070	.0340	.. .	.. .	.0022	.2168	....	.....		....	..	1.60	.....
657	15	58°	clear ...	sl. veg .	normal...	....	none	.0635	.0125	.....	.....	.0022	.2090	....	.. .	....	..	....	1.60	.....
813	Aug. 10	66°	slight ..	cons.	0.07	faintly veg. & tarry...	faintly veg. & tarry...	.0396	.0132	.0116	.0016	.0030	.2300	0.10	10.90	3.40	7.50	2.6	1.32	...
856	17	...	v. slight	cons. threads	0.07	faintly veg. & tarry.	decid. veg. sweetish .	.0408	.0148	.0104	.0044	.0045	.2650	0.12	.....	...	...	2.6	1.32	.....
899	24	60°	decid ..	cons.	0.23	faintly veg. & tarry...	decid. tarry..........	.0552	.0280	.0204	.0076	.0052	.2150	0.31	13.20	3.70	9.50	2.6	1.57	.. ..
1043	Sept. 29	56°	none. .	v. slight	0.03	dist. tarry.	dist. tarry...	.0328	.0070	.0070	.0000	.0030	.3500	0.04	13.10	4.30	8.80	2.6	1.53	.0070

MICROSCOPICAL EXAMINATION OF WATER FROM HEMPSTEAD STORAGE RESERVOIR; GATE HOUSE. TABLE

Number	3	4	24	30	38	46	68	84	94	99	113	135	157	185	208	243
Date of Collection	1896 Dec 8	Dec 18	1897 Jan 13	Jan 15	Jan 20	Feb 1	Feb 15	Mar 1	Mar 8	Mar 15	Mar 22	Mar 30	Apl 5	Apl 12	Apl 20	Apl 28
Temperature	Qualitative	Qualitative														54°
Diatomaceæ			20	18	31	1	101	21	86	93	29	21	94	132	442	802
Melosira									8		8	6	32	41	92	211
Navicula																
Nitzschia							94	7	8	21		8	52			
Synedra														78	207	570
Tabellaria								7	66	63	17		7	8	132	11
Pleurosigma																
Cyanophyceæ																2
Algæ			2				4		18	5	1	3	5	10	16	32
Cosmarium														6		
Dictyosphaerium																
Pediastrum																
Protococcus									5							5
Raphidium															10	18
Scenedesmus																
Staurastrum																
Rhisopoda									1							
Infusoria			2		2		15	4	4	18	4	13	22	23	18	51
Dinobryon							11								8	15
Dinobryon Cases										17		11	19	19	10	13
Monas																
Peridinium																23
Glenodinium																
Vermes							1	1								3
Polyarthra																
Crustacea																
Total Organisms			24	18	33	1	121	26	101	116	34	37	121	168	489	889
Total Genera	1	2	6	3	5	1	9	8	13	11	6	10	9	12	14	21

Number	271	306	335	381	429	464	512	546	578	590	616	644	686	729	772	809	850	910
Date of Collection	May 4	May 12	May 18	May 25	Jun 2	Jun 8	Jun 15	July 8	July 15	July 20	July 27	Aug 3	Aug 10	Aug 17	Aug 24	Aug 30	Sept 14	Sept 29
Temperature	58°	60°	65°	64°	64°	65°	69°	83°	80°	78°	73°	75°	77°	...	75°	78°	74°	63°
Diatomaceæ	217	865	463	687	85	26	3	144	583	611	572	202	402	755	737	427	816	831
Melosira	80	417	55	306	75	22	..	137	574	428	564	191	400	750	723	420	800	772
Navicula										5					6	7		28
Nitzschia										75								
Synedra	128	436	392	365							6							16
Tabellaria		8		10					5								8	8
Pleurosigma			6															
Cyanophyceæ	1	3				2		2				1		1	2			3
Algæ	11	49	20	20	6	1	3	10	19	45	19	21	18	13	13	11	20	30
Cosmarium																		
Dictyosphaerium											10	7	8	6				9
Pediastrum				9						8				5		5		
Protococcus				5														
Raphidium	7	40	10							12								
Scenedesmus			6					6	7	12		6	6		7		12	14
Staurastrum											5							
Rhisopoda		4																
Infusoria	14	26	16	15		1				7	34	47	34	24	8	9	8	23
Dinobryon																		
Dinobryon Cases		7	8	9														
Monas												5						
Peridinium	7	17	8	6						6	34	35	34	22		7		18
Glenodinium												6						
Vermes		4	1	1				5		2	2	3	1	3	1	2	4	
Polyarthra								5										
Crustacea		2			1			2										
Total Organisms	243	953	500	723	92	31	6	164	602	665	627	274	455	796	761	449	848	888
Total Genera	12	20	14	14	11	8	5	15	11	16	11	20	10	13	18	10	10	19

BACTERIAL EXAMINATION OF WATER FROM HEMPSTEAD STORAGE RESERVOIR; GATE HOUSE. TABLE 12.

Bacteria	Con	890	308	202	115	341	505	485	Liq	440	430	88	203	400	120	210
Meteorological Statistics.																
Rainfall in inches week preceding	.00	.47	.00	.03	.16	.98	1.11	.56	.66	1.30	.76	.59	.28	1.84	1.00	.08
Date	Dec 12	Dec 19	Jan 16	Jan 16	Jan 23	Feb 6	Feb 20	Mar 6	Mar 13	Mar 20	Mar 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1
Mean temperature week ending	42°	35°	29°	29°	31°	27°	34°	35°	37°	35°	42°	42°	47°	47°	46°	53°

Bacteria	112	77	40	52	50	260	65	..	....	50	1500	70	800	700	10000	800	700	100
Meteorological Statistics.																		
Rainfall in inches week preceding	1.40	.35	2.81	.95	1.74	.54	1.73	.75	4.37	3.91	3.12	2.24	1.06	.86	1.35	2.00	.00	1.17
Date	May 8	May 15	May 22	May 29	Jun 5	Jun 12	Jun 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	54°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60

In addition to the organisms tabulated above as occurring in quantities of five or more per C. C. in any one sample, the following were also found: ***Diatoms***—Amphiprora, Amphora, Asterionella, Cyclotella, Cymbella, Eunotia, Epithemia, Gomphonema, Meridion, Surirella; ***Cyanophyceæ***—Anabaena Clathrocystis, Microcystis, Oscillaria; ***Algæ***—Arthrodesmus, Botrycoccus, Chlorococus, Closterium, Coelastrum, Conferva, Desmidium, Pandorina, Micrasterias, Ulothrix, Zygnema; ***Rhizopoda***—Actinophrys, Euglypha; ***Infusoria***—Cryptomonas, Euglena, Glenodinum, Trachelomonas, Mallomonas; ***Vermes***—Anurea, Rotifer, Triarthra; ***Crustacea***—Cyclops, Daphnia, Acarina; ***Sponge spicules***.

MICROSCOPICAL EXAMINATION OF WATER FROM HEMPSTEAD STORAGE RESERVOIR; INLET.

(No. per c. c.) TABLE

Number	334	380	463	511	685	728	771	911
Date of Collection	1897 May 18	May 25	J'ne 8	J'ne 15	Aug 10	Aug 17	Aug 24	Sep 29
Temperature	60°	58°	54°	58°	60°	.	60°	56°
Diatomaceæ	3	157	22	3	6	10	10	19
Asterionella	.	...	10	....	..	...	....	...
Eunotia	..	36	..	....	....	...	....	....
Melosira	....	22	....	...	...	...	....	...
Meridion	..	12	..	....	....	...	.....	....
Navicula	..	47	7	....	5	9	8	12
Synedra	..	26	....	..	....	....	.....	.. .
Tabellaria	...	9	....	....	...	...	.....	....
Cyanophyceæ	....	1	...	...	1	....	1	
Algæ	1	17	....	..	2	3	1	1
Desmidium	....	8	. ..	....	...	..	.....	....
Protococcus	....	5	....	....	....	....	.. .	...
Fungi	3	..	1	..	...	..	. ..	...
Rhizopoda	....	3	....	..	....	....	.....	...
Infusoria	2	4	..	..	8	12	10	2
Cryptomonas	..	....	...	...	...	7	.	..
Monas	..	. ..	...		7	....	5	....
Trachelomonas	..	...	..	..	....	..	5	. .
Vermes	..	...	..	....	..	1	.....	....
Total Organisms	9	182	23	3	17	26	22	22
Total Genera	6	16	6	3	7	8	7	7

BACTERIAL EXAMINATION OF WATER FROM HEMPSTEAD STORAGE RESERVOIR; INLET.

(No. per c. c.) TABLE

Bacteria	2600	500	3800	420	2000	3600	22000	1000
Meteorological Statistics.								
Rain-fall in inches week preceding.	2.81	.95	.54	1.73	1.06	.86	1.35	1.17
Date	May 22	May 29	J'n e 12	J'n e 19	Aug 14	Aug 21	Aug 28	Sept 4
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	69°

CHEMICAL EXAMINATION OF WATER FROM SCHODACK BROOK: GATE (Parts per 100,000).

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																			
127	Feb 15							.0032	.0048			.0000	.1785						.60	
155	23							.0024	.0060			.0000	.1792						.60	
182	Mar 1							.0030	.0040			.0000	.1787		6.20	2.20	4.00	0·8	.55	
212	8							.0042	.0038			.0000	.1859						.70	
237	15							.0036	.0034			.0000	.1699						.65	
261	22			cons.				.0040	.0316			.0000	.2438						.60	
291	30							.0046	.0079			.0000	.1856						.70	
320	Apl 5							.0036	.0019			.0000	.1699		5.30	2.30	3.00		.60	
352	12							.0040	.0032			.0000	.1367						.65	
377	20							.0044	.0161			.0000	.1446						.70	
401	28				none		none	.0024	.0061			.0000	.1792						.65	
429	May 4	58°	sl. turb.	sl. veg.	normal		sl. marshy	.0048	.0092			.0000	.1360		7.20	3.00	4.20		.65	
460	12	56°	sl. turb.	sl. veg.	sl. straw		sl. marshy	.0048	.0207			.0000	.1690						.65	
487	18	57°	sl. turb.	none	normal		sl. marshy	.0054	.0136			.0000	.1332						.65	
531	25	59°	clear	none	sl. straw		none	.0028	.0082			.0000	.1294						.60	
576	June 2	54°	clear	none	sl. straw		sl. marshy	.0028	.0092			.0000	.2118		9.80	6.10	3.70		.60	
611	8	55°	clear	none	normal		none	.0060	.0110			.0000	.1350						.65	
659	15	69°	clear	none	normal		sl. marshy	.0064	.0121			.0000	.1429						.70	
707	July 16	62°	v. slight	slight		dist. veg & disagr'ble	dist. veg	.0032	.0122			.0003							0.59	
719	20	60°	v. slight	v. slight	0.09	faintly veg & unpl'sant	dist. veg	.0062	.0088			.0005	.0500						0.69	
745	27	59°	v. slight	v. slight	0.10	dist. veg & unpleasant	decid. veg	.0114	.0156			.0002	.0650	0.12	6.70				0.64	
773	Aug 2	60°	v. slight	v. slight	0.15	dist. veg & disagr'ble	dist. veg	.0038	.0076	.0076	.0000	.0005	.0550	0.12	6.10	2.30	3.80	1.1	0.62	
815	10	58°	v. slight	v. slight	0.12	faintly veg & unpl'sant	dist. veg	.0034	.0076	.0068	.0008	.0004	.0450	0.11	5.90	2.20	3.70	1.4	0.64	
858	17		v. slight	cons.	0.15	dist. veg & disagr'ble	dist veg.	.0028	.0074	.0062	.0012	.0005	.0470	0.20	5.60	1.90	3.70	0.9	0.64	
901	24	60°	none	v. slight	0.12	dist. veg & unpleasant	dist. veg	.0058	.0080	.0072	.0008	.0007	.0500	0.13	6.50	2.20	4.30	1.4	0.66	
938	30	72°	v. slight	slight	0.12	faintly veg & diagr'ble	faintly veg & disagr'ble	.0056	.0076	.0062	.0014	.0001	.0600	0.12	5.20	1.70	3.50	1.3	0.64	
983	Sept 14	60°	v. slight	v. slight	0.10	faintly veg & unpl'sant	faintly veg & disagr'ble	.0052	.0104	.0102	.0002	.0005	.0550	0.16	5.50	1.60	3.90	1.4	0.64	.0100
1041	29	54°	v. slight	v. slight	0.07	faintly veg & disagr'ble	faintly veg & unpl'sant	.0032	.0054	.0054	.0000	.0000	.0700	0.05	5.90	2.10	3.80	1.1	0.62	.0050

MICROSCOPICAL EXAMINATION OF WATER FROM SCHODACK BROOK; GATE. (No. per c. c.) TABLE

Number	66	69	83	114	136	156	186	209	244	272	307	336	382	430
Date of Collection	1897 Feb 10	Feb 15	Mch 1	Mch 22	Mch 30	Apl 5	Apl 12	Apl 20	Apl 28	May 4	May 12	May 18	May 25	J'ne 2
Temperature										58°	56°	57°	59°	54°
Diatomaceæ	4	17	9	4	8	8	5	8	17	4	6	4	8	1
Asterionella									12					
Eunotia		6												
Melosira														
Navicula		6												
Synedra														
Tabellaria						6								
Cyanophyceæ				1					1					
Oscillaria														
Algæ		1	5	1			2			1	1	3	2	1
Closterium			5											
Raphidium														
Zygnema														
Fungi		1						1						1
Infusoria	4	2	2	2			1	1	3				2	
Vermes			1											
Total Organisms	8	21	17	8	8	8	8	10	21	5	7	7	12	3
Total Genera	3	8	8	6	3	3	5	6	7	3	5	4	7	3

Number	465	513	547	579	591	617	645	687	730	773	810	851	909
Date of Collection	J'ne 8	J'ne 15	July 8	July 15	July 20	July 27	Aug 3	Aug 10	Aug 17	Aug 24	Aug 30	Sept 14	Sept 29
Temperature	55°	68°	64°	68°	68°	59°	68°	58°	...	60°	62°	60°	54°
Diatomaceæ	6	2	4	19	12	3	7	6	9	4	5	7	6
Asterionella													
Eunotia													
Melosira													
Navicula				9	6								
Synedra											5		
Tabellaria				8								6	
Cyanophyceæ						2		1	16	6	2	5	1
Oscillaria									16	6		5	
Algæ	6	2	9	3	10	2	9	8	28	19	4	1	3
Closterium													
Raphidium													
Zygnema	5		7		6		9	8	28	17			
Fungi	2	1			3								
Infusoria	3		1			1	4	4	1		1	1	1
Vermes													
Total Organisms	17	5	14	22	25	8	20	19	54	29	12	14	11
Total Genera	9	4	8	5	9	6	7	8	6	6	4	5	5

BACTERIAL EXAMINATION OF WATER FROM SCHODACK BROOK; GATE. TABLE 14

Bacteria	355	380	210	390	285	Liq.	300	800	200	1100	1300	800	490	400
Meteorological Statistics														
Rain-fall in inches week preceding	.82	1.11	.56	.76	.59	.28	1.84	1.00	.08	1.40	.35	2.81	.95	1.64
Date	Feb 13	Feb 20	Mch 6	Mch 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5
Mean temperature week ending	33°	34°	35°	42°	42°	47°	47°	46°	53°	54°	60°	60°	60°	62°

Bacteria	600	200	....	...	1000	500	400	2900	600	3600	400	2800	200
Meteorological Statistics													
Rain-fall in inches week preceding	.54	1.73	.75	4.37	3.91	3.12	2.24	1.06	.81	1.35	2.00	.00	1.17
Date	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the genera tabulated above as occurring in quantities of five or more per C. C., the following were also found. ***Diatoms***—Cymbella, Meridion, Curirella. ***Cyanophyceæ***—Oscillaria. ***Algæ***—Cosmarium, Desmidium, Pediastrum, Protococcus, Scenedesmus, Staurastrum, Spirogyra. ***Infusoria***—Cryptomonas, Dinobryon, Euglena, Monas, Peridinium, Synura, Glenodinium. ***Vermes***—Anguillula.

CHEMICAL EXAMINATION OF WATER FROM HEMPSTEAD (DE MOTT'S) POND; GATE HOUSE. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
7	Dec. 16	....	.....	.....	.....	.....	.....	.0048	.0060	..	....	.0000	.0454	....	5.30	2.80	2.50	1.2	.65	....
	1897																			
40	Jan 7	....	.....	.....	.....	.....	.....	.0042	.0062	....	....	.0000	.0542	....	....	..	....	..	.65	....
55	20	....	.....	.....	.....	.....	.....	.0028	.0060	....	....	....	.0801	....	5.20	2.00	3.20	....	.65	....
71	Feb 1	....	.....	.....	.....	.....	.....	.0038	.0066	....	....	.0000	.0958	....	....	....	....	....	.75	....
121	10	....	.....	.....	.....	.....	.....	.0026	.0082	....	....	.0000	.0802	....	....	....	....	....	.70	....
128	15	....	.....	.....	.....	.....	.....	.0024	.0070	....	....	.0000	.0886	....	....	....	....	....	.75	....
156	23	....	.....	.....	.....	.....	.....	.0026	.0076	....	....	.0000	.0555	....	....	....	....	....	.70	....
181	Mch 1	....	.....	.....	.....	.....	.....	.0018	.0086	....	....	.0000	.0644	....	....	....	....	....	.65	....
211	8	....	.....	.....	.....	.....	.....	.0022	.0074	....	....	.0000	.0641	....	....	....	....	....	.65	....
238	15	....	.....	.....	.....	.....	.....	.0012	.0074	....	....	.0000	.0814	....	....	....	....	....	.65	....
262	22	....	.....	.....	.....	.....	.....	.0014	.0086	....	....	.0000	.0812	....	....	....	..	....	.65	....
292	30	....	.....	.....	.....	.....	.....	.0004	.0100	....	....	.0000	.0571	.	....	....	....	..	.70	....
319	Apl 5	....	.....	.....	.....	.....	.....	.0018	.0066	....	....	.0000	.0562	....	5.50	2.90	2.60	....	.65	....
353	12	....	.....	.....	.....	.....	.....	.0000	.0086	....	....	.0000	.0577	....	....	....	....	....	.65	....
378	20	....	.....	.....	.....	.....	.....	.0008	.0172	....	....	.0000	.0569	....	....	....	....	....	.65	....
402	28	.	.....	.....	none,	.....	none	.0000	.0150	....	....	.0000	.0576	....	....	....	....	....	.65	....
430	May 4	58°	sl. turb.	sl. veg.	normal	.....	sl. marshy	.0040	.0175	....	....	.0000	.0379	..	4.70	1.70	3.00	....	.70	....
461	12	63°	sl. turb.	none	sl. straw	.....	none	.0000	.0132	....	....	.0000	.0306	..	....	....	....	....	.70	....
488	18	64°	sl. turb.	sl. veg.	normal	.....	none	.0004	.0236	....	....	.0000	.0244	....	....	....	....	....	.70	....
532	25	65°	sl. turb.	none	sl. straw	.....	sl. marshy	.0000	.0205	....	....	.0000	.0123	....	....	....	....	....	.70	....
577	June 2	63°	clear	.....	sl. straw	.....	sl. marshy	.0000	.0175	....	....	.0000	.0494	....	5.90	1.70	4.20	....	.70	....
612	8	64°	clear	none	sl. straw	.....	none	.0000	.0205	..	....	.0000	.0288	....	....	....	..	....	.70	....
660	15	71°	clear	none	normal	.....	sl. marshy	.0000	.0275	....	....	.0000	.0082	....	....	....	....	....	.70	....
708	July 16	81°	v. slight	slight	.....	faintly veg.	faintly veg.	.0008	.0216	...	....	.0000	..	....	....	....	....	....	0.68	....
720	20	77°	v. slight	slight	0.05	dist. veg.	faintly veg. & grassy	.0008	.0202	....	....	.0000	.0050	....	....	....	....	..	0.64	....
746	27	73°	v. slight	slight	0.35	dist. veg.	dist. veg. & unpleasant	.0062	.0242	....	....	.0000	.0050	0.43	5.40	....	....	..	0.66	....
774	Aug 2	77°	v. slight	slight	0.20	dist. veg. & unpleasant	faintly veg.	.0006	.0226	.0210	.0016	.0000	.0030	0.25	4.70	1.30	3.40	0.8	0.65	....
816	10	77°	v. slight	v. slight	0.23	faintly veg. & unpl't	faintly veg. & unpl't.	.0012	.0188	.0176	.0012	.0000	.0050	0.22	4.90	1.70	3.20	0.8	0.65	....
859	17	....	v. slight	v. slight	0.23	dist. veg. & grassy	dist. veg. & unpleasant	.0010	.0158	.0148	.0010	.0000	.0000	0.18	4.30	1.10	3.20	0.8	0.65	....
902	24	72°	v. slight	slight	0.22	dist. veg. & marshy	dist. veg. & marshy	.0010	.0152	.0152	.0000	.0000	.0000	0.23	5.30	1.40	3.90	0.6	0.66	....
939	30	78°	v. slight	slight	0.25	v. faintly veg.	faintly veg.	.0014	.0166	.0166	.0000	.0000	.0030	0.24	4.40	1.60	2.80	0.8	0.66	..
984	Sept 14	73°	v. slight	v. slight	0.17	v. faintly veg.	faintly veg.	.0006	.0166	.0148	.0018	.0000	.0000	0.20	4.10	1.20	2.90	1.3	0.69	.0010
1040	29	60°	v. slight	v. slight	0.12	v. faintly veg.	faintly veg.	.0012	.0120	.0116	.0004	.0000	.0050	0.11	4.20	1.00	3.20	0.9	9.66	.0120

MICROSCOPICAL EXAMINATION OF WATER FROM DE MOTT'S POND; GATE HOUSE. (No. per c. c.) TABLE

Number	15	47	82	93	115	137	155	187	210	245	273	308	337	383	431	466	514	548	580	592	618	646	688	731	774	811	852	908
Date of Collection	1896 Dec 30	1897 Feb 1	Mch 1	Mch 8	Mch 22	Mch 30	Apl 5	Apl 12	Apl 20	Apl 28	May 4	May 12	May 18	May 25	J'ne 2	J'ne 8	J'ne 15	July 8	Ju'y 15	July 20	July 27	Aug 3	Aug 10	Aug 17	Aug 24	Aug 30	Sept 14	Sept 29°
Temperature										54°	58°	63°	64°	65°	63°	64°		83°	81°	77°	73°	77°	77°		72°	70°	73°	60
Diatomaceæ		13	333	11	15			1	23	5	10	3	8	6	10	11		36	4	3	5	3	14	17	11	5	5	11
Melosira			20												5			31					14	11	10			6
Nitzschia		6	173																									
Tabellaria			127	6	10				12		9													5				
Cyanophyceæ			1		1										1								1					
Algæ			18		2		1		1		1		1	9		1		2	2	3	3	3	1	1	4	4	8	31
Arthrodesmus																											8	28
Conferva			5																									
Protococcus														9														
Senedesmus			6																									
Fungi					1												Lost			1							1	
Rhizopoda	Qualitative.													1				2										
Infusoria			207	3	10	4		3	3	2	1	3	3	3	1	3		2	61	33	19	27	8	29	16	21	12	15
Dinobryon			207		6															15				5				
Dinobyron Cases																			61	15	9							
Glenodinium																						10	5	9	10	15	9	14
Peridinium																						13		13	6	6		
Vermes			2										1					4					2		2			1
Total Organisms		13	560	14	29	4	1	4	27	7	12	6	13	19	12	15		46	67	40	27	33	26	47	33	30	26	58
Total Genera	4	5	17	6	8	1	1	2	8	4	4	4	7	7	5	10		9	6	6	7	7	7	7	8	6	10	8

BACTERIAL EXAMINATION OF WATER FROM DE MOTT'S POND; GATE HOUSE. (No. per c. c.) TABLE

Bacteria	171	128	320	470	280	118	420	400	280	164	115	270	500	250	180	3000	180	....	....	220	300	500	900	500	500	400	600	120
Meteorological Statistics.																												
Rain-fall in inches week preceding	.10	.98	.56	.66	.76	.59	.28	1.84	1.00	.08	1.40	.35	2.81	.95	1.64	.54	1.73	.75	4.37	3.91	3.12	2.24	1.06	.86	1.35	2.00	.00	1.17
Date	Jan 2	Feb 6	Mch 6	Mch 13	Mch 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending.	29°	27°	35°	37°	42°	42°	47°	47°	46°	53°	54°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the genera tabulated above as occurring in quantities of five or more per C. C. in any sample, the following were also found: ***Diatoms***—Amphora, Cyclotella, Cymbella, Epithemia, Eunotia, Meridion, Navicula, Synedra, Stauroneis, Pleurosigma; ***Cyanophyceæ***—Clathrocystis, Oscillaria; ***Algæ***—Chlorococcus, Closterium, Cosmarium, Dictyosphaerium, Euastrum, Pediastrum, Staurastrum, Ulothrix, Spirogyra, Zygnema: ***Rhizopoda***—Difflugia; ***Infusoria***—Cryptomonas, Euglena, Monas, Trachelomonas; ***Vermes***—Anurea, Polyartha, Rotifer: ***Sponge spicules***

CHEMICAL EXAMINATION OF WATER FROM PINE'S POND; OVERFLOW. (Parts per 100,000.)

No.	Date of Collection		Tem.	APPEARANCE			ODOR		AMMONIA				NITROGEN AS		Oxygen Consumed	RESIDUE ON EVAPORATION			Hardness	Chlorine	Iron
				Turbidity	Sediment	Color	Cold	Hot	Free	Albuminoid Total	Albuminoid In Solution	Albuminoid In Suspension	Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
263	Mar	22							.0014	.0300			.0000	.1388						.65	
293		30							.0018	.0112			.0000	.2044						.60	
318	Apl	5							.0010	.0085			.0000	.1368		5.50	2.40	3.10		.65	
354		12							.0004	.0221			.0000	.1808						.65	
379		20							.0014	.0061			.0000	.1306						.60	
403		28				none		none	.0000	.0110			.0000	.1811						.65	
431	May	4	59°	sl. turb.	sl. veg.	normal		none	.0000	.0160			.0000	.1482		6.30	4.30	2.00		.70	
462		12	63°	sl turb.	none	sl. straw		none	.0000	.0340			.0000	.0906						.75	
489		18	65°	clear	none	normal		sl. marshy	.0000	.0150			.0000	.0988						.70	
533		25	66°	clear	none	sl. straw		none	.0000	.0120			.0000	.0988						.65	
578	June	2	64°	clear	none	sl. straw		sl. marshy	.0000	.0150			.0000	.1318		6.20	4.70	1.50		.65	
613		8	63°	clear	none	sl. straw		sl. marshy	.0000	.0125			.0000	.1070						.70	
661		15	71°	clear	none	normal		sl. marshy	.0004	.0111			.0000	.1149						.70	
709	July	16	78°	v. slight	slight		dist. veg	dist. veg	.0004	.0144			.0001							0.59	
721		20	75°	v. slight	v. slight	0.05	dist. veg. & unpleasant	faintly veg.	.0006	.0152			.0003	.0350						0.66	
747		27	69°	v. slight	slight	0.10	dist. veg	dist. veg	.0062	.0234			.0001	.0400	0.32	6.00				0.60	
775	Aug	2	75°	v. slight	cons.	0.17	dist. veg	faintly veg.	.0006	.0162	.0116	.0046	.0001	.0320	0.24	5.90	2.30	3.60	1.4	0.65	
817		10	72°	v. slight	cons.	0.12	faintly veg.	dist. veg	.0026	.0122	.0108	.0014	.0002	.0400	0.15	5.50	1.80	3.70	1.1	0.70	
860		17	.	v. slight	v. slight	0.12	faintly veg.	faintly veg.	.0006	.0104	.0076	.0028	.0002	.0430	0.16	5.00	0.70	4.30	1.1	0.65	
903		24	68°	none	v. slight	0.12	faintly veg.	faintly veg. & marshy.	.0006	.0082	.0074	.0008	.0001	.0400	0.13	5.90	1.80	4.10	1.1	0.69	
940		30	78°	v. slight	cons.	0.08	v. faintly veg	v. faintly veg.	.0006	.0120	.0084	.0036	.0005	.0450	0.13	5.10	1.70	3.40	0.9	0.64	
985	Sept	14	68°	v. slight	v. slight	0.12	v. faintly veg	v. faintly veg.	.0012	.0086	.0082	.0004	.0001	.0530	0.12	4.70	1.30	3.40	1.3	0.65	.0100
1038		29	58°	v. slight	v. slight	0.07	faintly veg.	v. faintly veg.	.0006	.0078	.0078	.0000	.0001	.0600	0.08	5.60	1.80	3.80	0.9	0.64	.0070

CHEMICAL EXAMINATION OF WATER FROM PINE'S POND; INLET. (Parts per 100,000).

No.	Date of Collection	Tem.	APPEARANCE: Turbidity	APPEARANCE: Sediment	APPEARANCE: Color	ODOR: Cold	ODOR: Hot	AMMONIA: Free	AMMONIA: Albuminoid: Total	AMMONIA: Albuminoid: In Solution	AMMONIA: Albuminoid: In Suspension	NITROGEN AS: Nitrites	NITROGEN AS: Nitrates	Oxygen Consumed	RESIDUE ON EVAPORATION: Total	RESIDUE ON EVAPORATION: Loss on Ignition	RESIDUE ON EVAPORATION: Fixed	Hardness	Chlorine	Iron
490	May 18	60°	sl turb.	sl. veg.	normal...	....	sl. marshy..........	.0004	.0111	....	....	.0000	.1397	....	....	....	....	....	0.80	....
534	25	62°	clear...	none...	sl. straw..	....	sl. marshy..........	.0004	.0111	....	....	.0000	.1397	....	....	....	....	....	0.70	....
614	June 8	58°	clear...	none...	sl. straw..	....	sl. marshy..........	.0032	.0043	....	....	.0000	.1456	....	....	....	....	....	0.70	....
662	15	66°	clear...	sl. veg.	normal...	....	sl. marshy......	.0020	.0110	....	....	.0000	.1383	....	....	....	....	....	0.75	....
818	Aug 10	66°	v. slight	v. slight	0.15	faintly veg..........	dist. veg....	.0016	.0112	.0106	.0006	.0001	.0470	0.17	....	....	...	1.1	0.69	....
861	17		v. slight	cons...	0.15	faintly veg.	faintly veg & marshy..	.0014	.0102	.0074	.0028	.0001	.0450	0.17	5.00	1.70	3.30	0.9	0.69	....
904	24	63°	v. slight	v. slight	0.14	faintly veg & marshy..	faintly veg & marshy..	.0020	.0072	.0072	.0000	.0002	.0450	0.15	....	....	....	1.3	0.71	....
1039	Sept 29	56°	v. slight	v. slight	0.12	faintly veg & marshy..	faintly veg	.0034	.0080	.0078	.0002	.0000	.0750	0.08	....	....	....	1.1	0.69	....

MICROSCOPICAL EXAMINATION OF WATER FROM PINE'S POND; OVERFLOW. (No. per c. c.) TABLE

Number	14	25	59	100	138	154	188	211	246	274	309	338	384	432	467	515	549	581	593	619	647	689	732	775	812	853	906
Date of Collection	1896 Dec 30	1897 Jan 13	Feb 5	Mch 15	Mch 30	Apl 5	Apl 12	Apl 20	Apl 28	May 4	May 12	May 18	May 25	J'ne 2	Jn'e 8	J'ne 15	July 8	July 16	July 20	July 27	Aug 3	Aug 10	Aug 17	Aug 24	Aug 30	Sept 14	Sept 29
Temperature									50°	59°	63°	65°	66°	64°	63°	71°	78°	78°	75°	69°	75°	72°		68°	78°	68°	58°
Diatomaceæ		82	25	64	3	12	50	295	64	1116	1214	1441	402	115	186	24	21	12	9	2	6	10	1	8	1		3
Asterionella												277	39														
Cyclotella												100															
Cymbella								13																			
Eunotia		17	8	5			16	30				10															
Melosira							10	41		16		10			6	10	10										
Meridion		5																									
Navicula		47		13			6	33	7				6									6					
Tabellaria		8	7	38		5	16	162	7		10							6									
Synedra								12	43	1100	1200	1042	353	111	170	9											
Nitzschia																			8								
Cyanophyceæ						1							1	1						2		1					
Algæ		2		2		5		7	2	4	14	2	4	1	2	1	15		3	1	4	2	1	1		2	1
Raphidium											10						15										
Fungi				1				8				2			3	1											
Crenothrix								8																			
Rhizopoda															1												
Infusoria		1				1	3	2	6	68	6	24	157	40	67	11	1	12	8	114	13	13	8	4		2	4
Dinobryon										12			104	27	11	7											
Dinobryon Cases												6	53	6	34			11	5								
Glenodinium																				29		9	5				
Monas										52																	
Peridinium												17		7	22					83							
Vermes											3				1					5			2				
Total Organisms		85	25	67	3	19	53	312	72	1188	1237	1468	564	157	260	37	37	24	20	125	23	26	12	13	1	4	8
Total Genera	4	8	6	11	1	9	7	15	8	5	10	11	9	8	14	9	7	5	6	10	13	9	7	9	1	3	5

BACTERIAL EXAMINATION OF WATER FROM PINE'S POND; OVERFLOW. (No. per c. c.) TABLE

Bacteria	502	525	915	440	195	300	....	1200	2000	700	900	90	155	140	5500	90	....	....	300	500	800	800	400	1600	700	700	600
Meteorological Statistics.																											
Rain-fall in inches week preceding	.10	.00	.32	1.30	.59	.28	1.84	1.00	.08	1.40	.35	2.81	.95	1.64	.54	1.73	.75	4.37	3.91	3.12	2.24	1.06	.86	1.35	2.00	.00	1.17
Date	Jan 2	Jan 16	Feb 6	Mch 20	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	29°	29°	27°	35°	42°	47°	47°	46°	53°	54°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the genera tabulated above as occurring in quantities of five or more organisms per c. c. in any one sample, the following were also found: ***Diatoms***—Amphora, Cocconeis, Epithemia, Gomphonema, Surirella, Pleurosigma; ***Cyanophyceæ***—Anabaena, Clathrocystis, Oscillaria; ***Algæ***—Cosmarium, Protococcus, Euastrum, Scenedesmus, Staurastrum, Spirogyra, Zygnema; ***Infusoria***—Cryptomonas, Euglena, Glenodinium, Synura, Trachelomonas, Uvella, Uroglena; ***Vermes***—Anurea, Polyartha, Rotifer; ***Fungi***—Molds.

MICROSCOPICAL EXAMINATION OF WATER FROM PINE'S POND; INLET.

(No. per c.c.) TABLE

Number	339	385	468	516	690	733	776	907
Date of Collection	1897 May 18	May 25	J'ne 8	J'ne 15	Aug 10	Aug 17	Aug 24	Sept 29
Temperature	60°	62°	58°	66°	66°	....	65°	56°
Diatomaceæ	92	161	28	20	5	10	26	13
Navicula	...	....	..	...	....	..	....	7
Synedra	82	158	5	..	....	8	16	....
Tabellaria	....	..	12	16	...	..	8	...
Cyanophyceæ	1	...	...	....	...	1	...	...
Algæ	4	2	...	1	....	5	1	....
Zygnema	...	....	..	...	....	5	..	....
Fungi	...	....	1	1	...	..	..	...
Infusoria	8	73	....	5	80	8	1	1
Dinobryon	..	58	....	...	....	....	...	...
Dinobryon Cases	....	8	...		....	...	....	...
Glenodinium	...	....	...	...	79	....	....	....
Peridinium	...	7	....	....	..	....	....	..
Vermes	...	....	...	....	2	....	....	....
Crustaceæ	...	.	...	...	.	1	..	...
Total Organisms	105	236	29	27	87	25	28	14
Total Genera	9	7	7	7	5	9	6	6

BACTERIAL EXAMINATION OF WATER FROM PINE'S POND; INLET.

(No. per c.c.) TABLE

Bacteria	150	194	8400	Lost	2600	1400	2400	1000
Meteorogical Statistics								
Rain-fall in inches week preceding	2.81	.95	.54	1.73	1.06	.86	1.35	1.17
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	Oct 2
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	60°

CHEMICAL EXAMINATION OF WATER FROM TANGLEWOOD POND; OUTLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	APPEARANCE			ODOR		AMMONIA				NITROGEN AS		Oxygen Consumed	RESIDUE ON EVAPORATION			Hardness	Chlorine	Iron
			Turbidity	Sediment	Color	Cold	Hot	Free	ALBUMINOID Total	In Solution	In Suspension	Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
	1897																			
56	Jan 20	...	...	...	...	...	...	.0008	.0108	...	...	.0000	.0982	...	4.60	2.30	2.30	...	.60	...
72	Feb 1	...	...	...	...	...	...	.0012	.0084	...	...	.0000	.0978	...	...	...	...	...	.65	...
122	10	...	...	...	...	...	...	.0028	.0074	...	...	.0000	.1318	...	...	...	...	...	.65	...
157	23	...	...	...	...	...	...	.0022	.0094	...	...	.0000	.0970	...	...	...	...	...	.60	...
239	Mar 15	...	...	...	...	...	...	.0020	.0058	...	...	.0000	.1631	...	...	...	...	...	.70	...
264	22	...	...	...	...	...	...	.0004	.0096	...	...	.0000	.1397	...	...	...	...	...	.70	...
294	30	...	...	...	...	...	...	.0018	0054	...	...	.0000	.1879	...	...	...	...	...	.65	...
317	Apl 5	...	...	...	...	...	...	.0014	.0044	...	...	.0000	.1471	...	7.90	5.40	2.50	...	.65	...
355	12	...	...	...	...	...	...	.0010	.0040	...	...	.0000	.1886	...	...	...	...	...	.60	...
380	20	...	...	...	...	...	...	.0020	.0148	...	...	.0000	.1383	...	...	...	...	...	.70	...
404	28	...	...	...	none...	...	none...	.0000	.0060	...	...	.0000	.1318	...	...	...	...	...	.60	...
432	May 4	58°	clear...	sl. veg.	normal ..	...	sl. marshy...	.0000	.0135	...	...	.0000	.1482	...	6.40	3.80	2.60	...	.75	...
463	12	60°	sl. turb.	none...	sl. straw..	...	none...	.0000	.0124	...	...	.0000	.1153	...	...	...	...	...	.70	...
492	18	63°	sl. turb	none.	normal ..	...	sl. marshy...	.0000	.0185	...	...	.0000	.0988	...	...	...	...	...	.65	...
536	25	64°	clear...	none...	normal ..	...	none...	.0000	.0120	...	...	.0000	.1012	...	...	...	...	...	.70	...
579	June 2	59°	clear..	none...	sl. straw..	...	sl. marshy...	.0000	.0085	...	...	.0000	.1400	...	6.50	3.60	2.90	...	.70	...
616	8	62°	clear...	none...	sl. straw..	...	sl. marshy...	.0010	.0100	...	...	.0000	.0986	...	...	...	...	...	.65	...
664	15	67°	clear.	none...	normal ..	...	sl. marshy...	.0014	.0136	...	...	.0000	.1224	...	...	...	...	...	.65	...
710	July 16	75°	v. slight	v. slight	...	dist. veg & sweetish..	dist veg ...	.0004	.0096	...	...	.0000	...	...	...	...	...	...	0.61	...
722	20	68°	none...	v. slight	0.20	dist. veg...	dist. veg ...	.0022	.0078	...	...	.0001	.0200	...	...	...	...	1.1	0.56	...
748	27	63°	v. slight	v. slight	0.10	dist. veg ...	dist. veg ...	.0066	.0176	.0126	.0050	.0001	.0450	0.15	5.40	...	...	...	0.59	...
776	Aug 2	76°	v. slight	v. slight	0.17	dist. veg & aromatic..	faintly veg ...	.0072	.0128	.0128	.0000	0001	.0330	0.18	6.00	2.40	3.60	1.4	0.60	...
820	10	67°	v. slight	v. slight	0.12	faintly veg ...	faintly veg ...	.0008	.0086	0086	.0000	.0001	.0350	0.16	5.10	1.60	3.50	0.9	0.64	...
863	17	...	v. slight	v. slight	0.12	faintly veg ...	faintly veg ...	.0014	.0072	.0072	.0000	.0001	.0400	0.15	4.60	1.40	3.20	0.9	0.64	...
906	24	68°	v. slight	v. slight	0.12	v. faintly veg...	v. faintly veg...	.0010	.0058	0056	.0002	.0001	.0370	0.16	5.00	1.90	4.00	1.1	0.64	...
941	30	72°	v. slight	v. slight	0.12	v. faintly veg ...	faintly veg ...	.0002	.0066	.0066	.0000	.0002	.0350	0.12	4.90	1.60	3.30	1.1	0.65	...
986	Sept 14	65°	none...	v. slight	0.10	v. faintly veg ...	v. faintly veg...	.0012	.0114	.0110	.0004	.0001	.0500	0.10	4 40	1.10	3.30	1.6	0.61	.0100
1036	29	56°	none...	v. slight	0.05	faintly veg ...	faintly veg...	.0006	.0068	0068	.0000	.0000	.0600	0.06	4.00	1.60	3.30	0.9	0 61	.0070

NOTE—Samples numbered 56, 72 and 122 were collected from the centre of the pond.

CHEMICAL EXAMINATION OF WATER FROM TANGLEWOOD POND; INLET. (Parts per 100.000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																			
180	Mch 1	...	....	....	....	....	.. ..	.0018	.0078	....	.....	.0000	.0973	..	14.70	3.70	11.00	0.9	.65	.....
210	8	....	......	......	....	... .	....	.0024	.0034	.....	.....	.0000	.1463	....	.....	....	....	..	.60	.....
491	May 18	63°	sl. turb.	none ..	normal...	....	sl. veg	.000	.0240	... .	. .	.0000	.0988	....	....	...	....	.	.65	. .
535	25	63°	clear..	none ..	normal...	....	sl. marshy..	.0004	.0096	.. .	.....	.0000	.1067	....	... .	...	...	....	.65	. ...
615	June 8	60°	clear...	none ..	sl. straw..	....	none	.0014	.0076	....	.....	.0000	.1059	....	.....	. ..	....	....	.65	. ...
663	15	67°	clear...	sl. veg..	normal...	....	sl. marshy...........	.0018	.0157	...	....	.0000	.1138	....	.....	...	...	....	.70	. ...
819	Aug 10	67°	v. slight	v. slight	0.12	faintly veg...........	faintly veg........ ..	.0016	.0132	.0072	.0060	.0001	.0450	0.16	.....	....	....	1.1	.66	.....
862	17		v. slight	v. slight	0.12	faintly veg...........	faintly veg...	.0012	.0070	.0068	.0002	.0001	.0450	0.14	6.50	1.60	4.90	0.9	.64	.....
905	24	63°	none...	v. slight	0.12	faintly veg...........	v. faintly veg.	.0014	.0066	.0064	.0002	.0001	.0370	0.10	.....	....	....	1.1	.65	.....
1037	Sept. 29	56°	none...	v. slight	0.07	faintly veg. & unpleas't	faintly veg..	.0012	.0058	.0058	.0000	.0000	.0600	0.05	.....	...	....	0.9	.64	.....

MICROSCOPICAL EXAMINATION OF WATER FROM TANGLEWOOD POND; OUTLET. (No. per c. c.) TABLE

Number	48	139	153	189	212	247	275	310	341	387	433	470	518	550	582	594	620	648	692	735	778	813	854	904
Date of Collection	1897 Feb 1	Mch 30	Apl 5	Apl 12	Apl 20	Apl 28	May 4	May 12	May 18	May 25	J'ne 2	J'ne 8	J'ne 15	July 8	July 15	July 20	July 27	Aug 3	Aug 10	Aug 17	Aug 24	Aug 30	Sept 14	Sept 29
Temperature						52°	58°	60°	63°	64°	59°	62°	67°	76°	75°	68°	63°	76°	67°		68°	72°	65°	56°
Diatomaceæ	29	18	4	9	96	13	356	111	393	48	54	18	11	15	10	7	2	3	11	4	5	1	3	4
Eunotia					13									6										
Melosira					8		15									5								
Navicula					12																			
Synedra	5				25	8	334	108	374	46	51	14		8	7									
Tabellaria	15	5			24		5		13				9											
Pleurosigma					8																			
Cyanophyceæ						1															3	3		
Algæ		3			6				1			2	3		1		14	1	1				1	
Desmidium																	7							
Raphidium																	7							
Fungi					1						3											2		
Rhizopoda												1												
Infusoria		5				1	8		4	31	28	4			1		6	1	3	1	2	2		1
Dinobryon										28	25													
Peridinium																	6							
Vermes												5												
Total Organisms	29	26	4	9	103	15	364	111	398	78	85	30	14	15	12	17	22	5	15	5	10	8	4	5
Total Genera	7	11	4	5	13	6	6	2	8	5	5	7	3	3	4	3	5	5	7	3	5	4	3	3

BACTERIAL EXAMINATION OF WATER FROM TANGLEWOOD POND; OUTLET. (No. per c. c.) TABLE

Bacteria	....	230	400	240	400	240	1350	700	250	240	195	3700	130	....	....	600	300	500	11000	800	600	700	800	500
Meteorological Statistics.																								
Rain-fall in inches for week preceding	.98	.59	.28	1.84	1.00	.08	1.40	.35	2.81	.95	1.64	.54	1.73	.75	4.37	3.91	3.12	2.24	1.06	.86	1.35	2.00	.00	1.17
Date	Feb 6	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature for week ending	27°	42°	47°	47°	46°	53°	54°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the genera tabulated above as occurring in quantities of five or more per C. C. in any one sample the following were also found: ***Diatoms***—Asterionella, Cyclotella, Cymbella, Fragilaria, Gomphonema, Meridion, Nitzschia; ***Cyanophyceæ***—Oscillaria; ***Algæ***—Conferva, Cosmarium, Pandorina, Pediastrum, Scenedesmus, Staurastrum; ***Infusoria***—Cryptomonas, Glenodinium, Monas, Uvella, Uroglena; ***Vermes***—Anguillula, Polyartha; ***Sponge spicules.***

MICROSCOPICAL EXAMINATION OF WATER FROM TANGLEWOOD POND; INLET.

(No. per c. c.) TABLE

Number	340	386	469	517	691	734	777	905
Date of Collection	1897 May 18	... May 25	.... J'ne 8	.... J'ne 15	.. Aug 10	.. Aug 17	.. Aug 24	.... Sept 29
Temperature	63°	63°	60°	67°	70°	...	68°	56°
Diatomaceæ	300	89	11	6	...	2	2	8
Melosira	..	6	....	...	...	..	....	....
Synedra	298	82	9	...	....	...	..	6
Algæ	6	....	2	....	....	1	..	....
Pandorina	6	...	....	....	....	....	...	....
Rhizopoda	..	....	...	1	. ..	....	...	...
Infusoria	5	42	5	1	6	2	1	1
Dinobryon	..	38	....	..	...	...	....	...
Glenodinium	..	....	. ..	....	6	..	..	....
Total Organisms	311	135	18	8	6	5	3	9
Total Genera	4	7	7	5	1	3	2	3

BACTERIAL EXAMINATION OF WATER FROM TANGLEWOOD POND; INLET.

(No. per c. c) TABLE

Bacteria	150	260	20000	1100	1300	200	900	400
Meteorological Statistics.								
Rain-fall in inches week preceding	2.81	.95	.54	1.73	1.06	.86	1.35	1.17
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	Oct 2
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	60°

CHEMICAL EXAMINATION OF WATER FROM SMITH'S POND; PUMPING STATION. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
6	Dec 16	...	...	...	...	...	...	.0008	.0056	...	...	.0000	.0982	...	4.50	.70	2.80	1.2	.55	...
	1897																			
41	Jan 7	...	...	...	...	...	...	.0024	.0050	...	...	.0000	.1051	...	...	...	...	...	.55	...
57	20	...	...	...	...	...	...	.0024	.0050	...	...	.0000	.1051	...	4.40	1.40	3.00	...	.65	...
73	Feb 1	...	...	...	...	...	...	.0024	.0054	...	...	.0000	.1133	...	...	...	...	...	.55	...
123	10	...	...	...	...	...	...	.0026	.0062	...	...	.0000	.1213	...	...	...	...	...	.60	...
129	15	...	...	...	...	...	...	.0024	.0026	...	...	.0000	.1298	...	...	...	...	...	.55	...
158	23	...	...	...	...	...	...	.0020	.0080	...	...	.0000	.1219	...	...	...	...	...	.55	...
179	Mar 1	...	...	...	...	...	...	.0028	.0054	...	...	.0000	.0965	...	4.20	1.50	2.70	...	.60	...
209	8	...	...	...	...	...	...	.0018	.0050	...	...	.0000	.1056	...	...	...	...	...	.60	...
240	15	...	...	...	...	...	...	.0018	.0096	...	...	.0000	.1220	...	...	...	...	...	.65	...
265	22	...	...	...	...	...	...	.0018	.0110	...	...	.0000	.0973	...	...	...	...	...	.60	...
405	Apl 28	...	...	...	none	...	marshy	.0004	.0091	...	...	.0000	.0903	...	...	...	...	...	.60	...
433	May 4	57°	sl. turb.	none	normal	...	none	.0012	.0183	...	...	.0000	.1061	...	6.20	3.70	2.50	...	.65	...
537	25	64°	clear	none	normal	...	sl. marshy	.0008	.0082	...	...	.0000	.0652	...	...	...	...	...	.65	...
580	June 2	69°	clear	none	sl. straw	...	sl. marshy	.0000	.0120	...	...	0000	.1235	...	6.00	4.00	2.20	...	.65	...
617	8	61°	clear	none	sl. straw	...	none	.0006	.0119	...	...	.0000	.0571	...	...	...	...	...	.60	...
665	15	68°	clear	none	normal	...	sl. marshy	.0024	.0221	...	...	.0000	.0886	...	...	...	...	...	.65	...
711	July 16	77°	v. slight	v. slight	...	dist. veg. & mouldy	dist. veg	.0008	.0062	...	...	.0000	...	...	...	...	...	...	.58	...
723	20	73°	v. slight	slight	0.10	dist. veg	dist. veg	.0038	.0128	...	...	.0001	.0270	...	...	...	...	...	.56	...
749	27	68°	v. slight	cons.	0.20	dist. veg	dist. veg	.0076	.0206	.0190	.0016	.0001	.0170	0.24	4.80	...	...	...	.59	...
777	Aug 2	75°	v. slight	slight	0.25	dist. veg. & earthy	dist. veg. & earthy	.0062	.0160	.0160	.0000	.0001	.0180	0.26	5.10	1.40	3.70	1.4	.61	...
821	10	73°	v. slight	v. slight	0.20	faintly veg. & grassy	dist. veg	.0036	.0130	.0128	.0002	.0001	.0170	0.21	4.90	1.40	3.50	1.1	.61	...
864	17	...	v. slight	v. slight	0.22	faintly veg	faintly veg	.0018	.0104	.0094	.0010	.0001	.0250	0.11	4.30	1.20	3.10	0.9	.64	...
907	24	70°	v. slight	v. slight	0.23	faintly veg	faintly veg	.0022	.0098	.0086	.0012	.0001	.0250	0.16	5.50	1.40	4.10	1.1	.64	...
942	30	70°	v. slight	v. slight	0.20	faintly veg	faintly veg	.0006	.0108	.0102	.0006	.0001	.0330	0.18	4.40	1.20	3.20	0.9	.59	...
987	Sept 14	68°	v. slight	v. slight	0.12	faintly veg	v. faintly veg. & mouldy	.0012	.0112	.0108	.0004	.0000	.0230	0.14	4.80	1.20	3.60	1.4	.61	.0130
1034	29	57°	v. slight	v. slight	0.17	faintly veg	faintly veg	.0030	.0098	.0084	.0014	.0000	.0250	0.15	4.90	1.10	3.80	0.8	.64	.0300
295	Mch 30	...	...	...	...	...	...	.0018	.0086	...	...	.0000	.1303	...	...	...	...	...	.55	...
316	Apl 5	...	...	...	...	...	...	.0016	.0076	...	...	.0000	.1140	...	5.60	2.80	2.80	...	.65	...
356	12	...	...	...	...	...	...	.0004	.0156	...	...	.0000	.1233	...	...	...	...	...	.65	...
381	20	...	...	...	...	...	...	.0012	.0128	...	...	.0000	.1061	...	...	...	...	...	.65	...
464	May 12	61°	sl. turb.	none	sl. straw	...	none	.0004	.0236	...	...	.0000	.0985	...	...	...	...	...	.70	...
493	18	63°	clear	none	sl. straw	...	none	.0000	.0115	...	...	.0000	.1235	...	...	...	...	...	.65	...

Note.—Samples numbered 295, 316, 356, 381, 464 and 493 were collected from the tap in the pumping station. All the other samples were collected from the pump-well.

CHEMICAL EXAMINATION OF WATER FROM SMITH'S POND; WEST INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	APPEARANCE			ODOR		AMMONIA				NITROGEN AS		Oxygen Consumed	RESIDUE ON EVAPORATION			Hardness	Chlorine	Iron
									ALBUMINOID											
			Turbidity	Sediment	Color	Cold	Hot	Free	Total	In Solution	In Suspension	Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
494	May 18	60°	sl. turb.	none ..	normal ..	....	none	.0000	.0095	.....	.. ..	.0000	.1070	...	.....	...	....	...	.65	.....
538	25	65°	clear ..	none ..	normal ..	....	sl. marshy..........	.0004	.0071	. .	.. .	.0000	.0285	...	.....	. .	...	....	.60	.....
822	Aug 10	68°	v. slight	slight ..	0.12	faintly veg	faintly veg	.0038	.0106	.0102	.0004	.0000	.0430	0.16	.....	...	. .	0.9	.61	.....
865	17	....	v. slight	slight ..	0.23	faintly veg	faintly veg...........	.0016	.0066	.0062	.0004	.0002	.0400	0.23	5.40	1.50	3.90	0.9	.61	.....
908	24	66°	v. slight	v. slight	0.14	faintly veg & disag'ble	faintly veg	.0016	.0064	.0064	.0000	.0001	.0430	0.14	5.50	1.40	4.10	1.1	.64	.....
1035	Sept 29	55°	none	cons ...	0.07	v. faintly veg	v. faintly veg	.0012	0074	.0060	.0014	.0000	.0550	0.06	.....	...	...	0.8	.64	.....

CHEMICAL EXAMINATION OF WATER FROM SMITH'S POND; EAST INLET. (Parts per 100,000.)

618	June 8	57°	sl. turb.	sl. veg..	normal...	....	none	.0006	.0119	.....	.....	.0000	.0489	....	.....	...	...	...	.60	.....
666	15	64°	clear ..	none ..	normal...	....	sl. marshy	.0022	.0108	....	. ...	.0000	.0475	....	.....	.....	.....	....	.60	.....

MICROSCOPICAL EXAMINATION OF WATER FROM SMITH'S PUMPING STATION; TAP. (No. per c. c.) TABLE

Number	13	31	44	60	92	116	140	152	190	213	248	276	311	342	388	434	471	519	551	583	595	621	649	693	736	779	814	855	902
Date of Collection	Dec 30	Jan 15	Jan 22	Feb 5	Mar 8	Mar 22	Mar 30	Apl 5	Apl 12	Apl 20	Apl 28	May 4	May 12	May 18	May 25	J'ne 2	J'ne 8	J'ne 15	July 8	July 16	July 20	July 27	Aug 3	Aug 10	Aug 17	Aug 24	Aug 30	Sept 14	Sept 29
Temperature											54°	57°	61°	63°	64°	59°	61°	68°	76°	77°	73°	68°	75°	73°		70°	74°	68°	57°
Diatomaceæ		17	15	6	13	46	16	7	7	88	61	323	251	356	31	10	16	18	10	12	31	62	4	3	2	19	2	13	13
Cymbella										8	6																		
Eunotia										7		5																	
Melosira						14				24	31	20		41	19						18	30				10			
Navicula		9	5			6	8			8	7									5	5	15						6	
Tabellaria					6	23	8			14	9	10		5								5							
Synedra										19	6	284	242	299	9				5										5
Pleurosigma														5															
Cyanophyceæ						1					4				1			1									1		
Algæ		1			3	1	3			2	3	3				2		2	1		1	4	1		1	2	2		
Fungi						1	1			3								1				1	3						
Rhizopoda											2		1																
Infusoria		1		2	4		55	10		9	28	69	9	10	32	20	14	4		5	6	10	6	4	5	11	3	1	7
Dinobryon							28	8		8	6	53		6	29	12	9												
Dinobryon Cases							25				21	12	5			8	5			5									
Monas																													
Vermes				1								1			3											5			5
Total Organisms		19	15	9	20	49	75	17	7	102	98	396	261	366	67	32	30	26	11	17	38	77	15	7	8	32	8	14	20
Total Genera	3	8	6	6	9	8	8	4	2	14	13	11	9	8	9	7	7	11	4	6	8	14	7	4	5	10	6	4	9

BACTERIAL EXAMINATION OF WATER FROM SMITH'S PUMPING STATION; TAP. (No. per c. c.) TABLE

Bacteria	360	550	1200	398	7000	360	250	400	400	2600	170	1700	1400	180	900	220	Lost	180	....	....	700	700	1400	400	1000	900	600	1300	400
Meteorological Statistics.																													
Rain-fall in inches week preceding	.10	.03	2.18	.32	.66	.76	.59	.28	1.84	1.00	.08	1.40	.35	2.81	.95	1.64	.54	1.73	.75	4.37	3.91	3.12	2.24	1.06	.86	1.35	2.00	.00	1.17
Date	Jan 2	Jan 16	Jan 23	Feb 6	Mar 13	Mar 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	29°	29°	31°	27°	37°	42°	42°	47°	47°	46°	53°	54°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the genera tabulated above as occurring in quantities of five or more per C. C, in any one sample, the following were also found: ***Diatoms***—Achnanthes, Amphora, Cyclotella, Epithemia, Gomphonema, Meridion, Nitzschia, Surirella; ***Cyanophyceæ***—Anabaena, Clathrocystis, Oscillaria; ***Algæ***—Conferva, Closterium, Cosmarium, Euastrum, Protococcus, Pandorina Raphidium, Scenedesmus, Staurastrum, Spirogyra, Zygnema; ***Rhizopoda***—Actinophrys; ***Infusoria***—Euglena, Glenodinium, Peridinium, Synura; ***Vermes***—Anurea, Polyartha, Rotifer

MICROSCOPICAL EXAMINATION OF WATER FROM SMITH'S POND.

(No. per c.c.) TABLE

	East Inlet				West Inlet			
Number	343	389	472	520	694	737	780	903
Date of Collection	1897 May 18	May 25	J'ne 8	J'ne 15	Aug 10	Aug 17	Aug 24	Sept 29
Temperature	60°	..	57°	69°	68°	..	66°	56°
Diatomaceæ	301	30	167	28	1	7	8	7
Eunotia	...	....	22	08	....	...	....	....
Melosira	....	..	42	10	....	..	....	6
Synedra	299		....	..	....	...	...	...
Tabellaria	....	24	93	9	...	...	....	..
Cyanophyceæ	....	....	..	...	...	...	...	1
Algæ	1	...	20	1	....	....	2	...
Desmidium	..	...	17	.	..	...	...	...
Fungi	..	...	1	...	....	..	...	...
Infusoria	10	..	1	..	....	1	...	2
Dinobryon	7	...	....	..	...	...	..	...
Vermes	..	.	....	....	1	1	...	...
Total Organisms	312	30	189	29	2	9	10	10
Total Genera	6	4	12	5	2	7	7	5

BACTERIAL EXAMINATION OF WATER FROM SMITH'S POND.

(No. per c.c.) TABLE

	East Inlet				West Inlet			
Bacteria	190	210	2200	165	liq.	600	1300	7000
Meteorological Statistics								
Rain-fall in inches week preceding	2.81	.95	.54	1.73	1.06	.86	1.35	1.17
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	Oct 2
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	60°

CHEMICAL EXAMINATION OF WATER FROM VALLEY STREAM RESERVOIR; GATE HOUSE. (Parts per 100,000).

No.	Date of Collection	Tem.	APPEARANCE			ODOR		AMMONIA				NITROGEN AS		Oxygen Consumed	RESIDUE ON EVAPORATION			Hardness	Chlorine	Iron
			Turbidity	Sediment	Color	Cold	Hot	Free	Albuminoid Total	Albuminoid In Solution	Albuminoid In Suspension	Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
	1897																			
38	Jan 6	...	...	...	...	...	...	.0048	.0122	...	...	.0000	.1937	...	...	...	...	...	.60	...
196	Mar 2	...	...	...	...	...	...	.0055	.0095	...	...	.0000	.1931	...	7.90	3.90	4.00	...	.75	...
233	10	...	...	...	...	...	...	.0014	.0071	...	...	.0000	.2129	...	...	...	...	...	.65	...
251	17	...	...	...	...	...	...	.0000	.0088	...	...	.0000	.1976	...	...	...	...	...	.60	...
281	24	...	...	...	...	...	...	.0006	.0080	...	...	.0000	.1971	...	...	...	...	...	.65	...
305	31	...	...	...	...	...	...	.0000	.0094	...	...	.0000	.1976	...	...	...	...	...	.65	...
341	Apl 7	...	...	...	...	...	...	.0000	.0092	...	...	.0000	.1812	...	6.70	3.00	3.70	...	.70	...
366	14	...	...	...	...	...	...	.0004	.0091	...	...	.0000	.1644	...	...	...	...	...	.65	...
396	23	...	...	...	...	...	...	.0008	.0132	...	...	.0000	.1805	...	7.50	3.50	4.00	...	.70	...
414	30	...	...	...	normal ..	...	marshy ...	.0000	.0092	...	...	.0000	.1812	...	...	...	...	...	.60	...
448	May 6	64°	sl. turb.	none...	sl. straw.	...	sl. marshy...	.0000	.0118	...	...	.0000	.2141	...	6.80	3.50	3.30	...	.65	...
473	14	59°	sl. turb.	none...	sl. straw.	...	sl. marshy...	.0004	.0156	...	...	.0000	.1979	...	...	...	...	...	.65	...
516	20	66°	clear...	none...	sl. straw.	...	sl. veg ...	.0000	.0185	...	...	.0000	.1388	...	...	...	...	...	.65	...
560	27	64°	clear...	sl. veg.	sl. straw.	...	sl. veg ...	.0014	.0161	...	...	.0000	.2129	...	...	...	...	.	.75	...
597	J'ne 4	68°	clear...	none...	md. straw	...	sl. marshy...	.0014	.0256	...	...	.0000	.1965	...	7.40	3.90	3.50	...	.65	...
628	9	..	clear...	none...	sl. straw.	...	none...	.0004	.0136	...	...	.0000	.1314	...	...	...	...	...	.65	...
676	16	74°	clear...	none...	sl. straw.	...	sl. marshy...	.0000	.0180	...	...	.0000	.1976	...	...	...	...	...	.65	...
703	July 15	78°	v. slight	v. slight	...	v. faintly veg.. ...	faintly veg ...	.0012	.0264	...	...	.0000	...	...	...	...	...	...	0.64	...
729	21	72°	v. slight	v. slight	0.40	v. faintly veg...	v. faintly veg...	.0018	.0186	...	...	.0001	.0100	...	...	...	...	1.4	0.64	...
755	29	66°	v. slight	v. slight	0.25	faintly veg ...	dist. veg ...	.0016	.0186	...	...	.0000	.0700	0.34	6.90	3.20	3.70	1.8	0.69	...
788	Aug 4	75°	v. slight	v. slight	0.30	dist. veg ...	faintly veg ...	.0006	.0122	.0118	.0004	.0002	.0700	0.27	5.90	2.40	3.50	1.9	0.69	...
831	11	72°	v. slight	v. slight	0.16	fatntly veg & marshy.	faintly veg ...	.0006	.0096	.0096	.0000	.0003	.0750	0.23	6.30	2.20	4.10	1.6	0.66	...
874	18	...	none...	v. slight	0.12	faintly veg & earthy ..	v. faintly veg ...	.0012	.0094	.0088	.0006	.0005	.0630	0.14	6.20	1.70	4.50	1.6	0.59	...
917	25	70°	none...	v. slight	0.12	v. faintly veg...	faintly veg & earthy ..	.0006	.0096	.0094	.0002	.0006	.0500	0.15	5.60	2.00	3.60	1.6	0.64	...
957	31	64°	none...	slight ..	0.12	faintly veg ...	faintly veg & marshy..	.0012	.0114	.0086	.0028	.0008	.0700	0.12	5.70	1.90	3.80	1.4	0.64	...
992	Sept 15	70°	v. slight	v. slight	0.12	faintly veg ...	v. faintly veg ...	.0006	.0110	.0102	.0008	.0014	.0750	0.13	6.80	1.90	4.90	1.7	0.65	.0070
1032	28	59°	v. slight	v. slight	0.07	faintly veg ...	faintly veg ...	.0006	.0088	.0088	.0000	.0003	.0900	0.11	5.90	2.40	3.50	1.4	0.64	.0050

CHEMICAL EXAMINATION OF WATER FROM VALLEY STREAM RESERVOIR; INLET. (Parts per 100,000).

No.	Date of Collection	Tem.	APPEARANCE: Turbidity	APPEARANCE: Sediment	APPEARANCE: Color	ODOR: Cold	ODOR: Hot	AMMONIA: Free	AMMONIA: Albuminoid: Total	AMMONIA: Albuminoid: In Solution	AMMONIA: Albuminoid: In Suspension	NITROGEN AS: Nitrites	NITROGEN AS: Nitrates	Oxygen Consumed	RESIDUE ON EVAPORATION: Total	RESIDUE ON EVAPORATION: Loss on Ignition	RESIDUE ON EVAPORATION: Fixed	Hardness	Chlorine	Iron
	1897																			
397	Apl 23	....	....	....	....	....	....	.0044	.0066	....	....	.0000	.1775	....	7.00	3.20	3.80	....	.65	....
517	May 20	62°	clear	none	sl. straw	....	sl. veg.	.0018	.0162	....	....	.0000	.1962	....	....	....	....	....	.65	....
561	27	61°	clear	sl. veg.	sl. straw	....	sl. veg.	.0032	.0208	....	....	.0000	.1785	....	....	....	....	....	.70	....
629	June 9	....	sl. turb.	none	sl. straw	....	sl. marshy	.0020	.0200	....	....	.0000	.1136	....	....	....	....	....	.65	....
677	16	64°	clear	sl. veg.	sl. straw	....	sl. marshy	.0000	.0128	....	....	.0000	.1482	....	....	....	....	....	.60	....
832	Aug 11	63°	v. slight	slight	0.16	faintly veg. & unpleas't	faintly veg.	.0018	.0076	.0066	.0010	.0001	.0970	0.17	....	....	....	1.4	.66	....
875	18	.	none	slight	0.15	faintly veg.	v faintly veg	.0016	.0056	.0052	.0004	.0000	.0850	0.11	6.70	2.30	4.40	1.6	.61	....
918	25	61°	v. slight	cons.	0.14	v. faintly veg.	faintly veg.	.0020	.0108	.0054	.0054	.0001	.1000	0.10	6.20	1.90	4.30	1.6	.64	....
1033	Sept 29	50°	v. slight	cons.	0.12	faintly veg.	faintly veg.	.0012	.0066	.0052	.0014	.0000	.1350	0.06	....		....	1.4	.61	....

MICROSCOPICAL EXAMINATION OF WATER FROM VALLEY STREAM RESERVOIR; GATE HOUSE. (No. per c.c.) TABLE

Number	8	28	54	89	107	127	146	177	200	228	257	291	320	367	414	451	482	530	556	574	601	627	660	703	746	789	860	900
Date of Collection	1896 Dec 28	1897 Jan 14	Feb 3	Mch 2	Mch 17	Mch 24	Mch 31	Apl 7	Apl 14	Apl 23	Apl 30	May 6	May 14	May 20	May 27	J'ne 4	J'ne 9	J'ne 16	July 9	July 15	July 21	July 28	Aug 4	Aug 11	Aug 18	Aug 25	Sept 15	Sept 28
Temperature		....	....	....	....	....	....	....	55°	58°	62°	64°	59°	66°	64°	68°	..	74°	82°	75°	72°	66°	75°	72°	...	70°	70°	59°
Diatomaceæ	Qualitative	133	80	34	1	5	2	3	1	4	9	45	6	2	24	5	38	...	1	4	4	9	....	1	5	3	1	1
Eunotia		61	26	6								6																
Gomphonema		5																										
Melosira			8												12		32					8			5			
Meridion		6																										
Navicula		37	10	6								6																
Synedra			14								9	25	5		6													
Tabellaria		15	20	12								5																
Cyanophyceæ		3																					2					
Algæ			2			1	4		6		1				1	8			1			5		1	1		8	
Protococcus																6												
Scenedesmus																											8	
Fungi				2					1				2			1	1											
Infusoria				2		3	1	2	1	2	43	8		3	1		2		1	..	3	16	13	8	1	5	1	5
Dinobryon											43											16	8					
Dinobryon Cases												5											5					
Uroglena																								5				
Vermes																						1			4			1
Total Organisms		136	82	38	1	10	7	5	9	6	53	53	9	5	26	14	41	1	3	4	7	31	15	10	11	8	10	7
Total Genera	9	10	7	9	1	6	4	4	5	2	3	7	3	2	7	7	6	1	3	3	5	6	2	5	4	7	3	5

BACTERIAL EXAMINATION OF WATER FROM VALLEY STREAM RESERVOIR; GATE HOUSE. (No. per c. c.) TABLE

Bacteria	1300	1000	1500	2100	350	460	300	200	185	125	64	280	2200	300	130	320	Liq	110	....	..	600	6600	200	1000	200	800	800	100
Meteorological Statistics.																												
Rain-fall in inches week preceding	.50	.00	1.30	.06	1.21	1.22	.18	.62	1.50	.49	.08	1.40	2.94	.87	.95	1.74	1.18	.99	.75	4.37	2.21	2.42	2.31	1.14	.58	1.50	.00	1.17
Date	Jan 2	Jan 16	Feb 6	Mch 6	Mch 20	Mch 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 18	Oct 2
Mean temperature week ending	29°	29°	27°	35°	35°	42°	42°	47°	47°	46°	53°	54°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	68°	60°

In addition to the genera tabulated above as occurring in quantities of five or more per C. C. in any one sample, the following were also found: ***Diatoms***—Cyclotella, Nitzschia, Tabellaria; ***Cyanophyceæ***—Anabaena, Microcystis, Oscillaria; ***Algæ***—Cosmarium, Desmidium, Dictyosphaerium, Raphidium, Spirogyra; ***Infusoria***—Cryptomonas, Glenodinium, Monas, Peridinium, Synura; ***Fungi***—Molds; ***Miscellaneous***—Amorphous matter.

MICROSCOPICAL EXAMINATION OF WATER FROM VALLEY STREAM POND; INLET.

(No. per C. C.) TABLE

Number	368	415	483	531	704	747	790	901
Date of Collection	1897 May 20	May 27	J'ne 9	J'ne 16	Aug 11	Aug 18	Aug 25	Sept 29
Temperature	62°	57°	...	64°	65°	...	61°	50°
Diatomaceæ	26	44	41	12	9	2	26	1
Eunotia	...	7	7	....	....	....	....	....
Navicula	10	9	11	..	....	....	..	....
Synedra	7	18	8	....	....	....	....	....
Tabellara	5	...	7	....	....	....	19	...
Cyanophyceæ	..	1	...	..	....	..	....	...
Algæ	1	1	1	4	1	..	1	....
Fungi	1	....	...	....	....	....	..	....
Infusoria	1	1	3	1	....	2	...	1
Total Organisms	29	46	45	17	10	4	27	2
Total Genera	8	10	11	9	4	3	4	2

BACTERIAL EXAMINATION OF WATER FROM VALLEY STREAM POND; INLET.

TABLE

Bacteria	1500	450	..	400	100	1600	1500	900
Meteorological Statistics.								
Rain-fall in inches for week preceding	.87	.95	1.18	.99	1.14	.58	1.50	1.17
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	Oct 2
Mean temperature week ending	90°	60°	61°	68°	73°	73.	70°	60°

CHEMICAL EXAMINATION OF WATER FROM WATT'S POND; PUMPING STATION. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
5	Dec 15							.0000	.0188			.0000	.1812		5.80	2.70	3.10		.70	
	17							.0100	.0070			.0000	.1565		7.30	2.30	5.00	1.8	.65	
12	1897																			
37	Jan 6							.0048	.0084			.0000	.1607						.60	
66	27							.0082	.0054			.0000	.2078		7.10	3.20	3.90		.55	
84	Feb 3							.0074	.0058			.0000	.1916						.60	
116	9							.0080	.0100			.0000	.1910						.55	
159	16							.0082	.0098			.0000	.2074						.65	
173	25							.0066	.0100			.0000	.2334						.60	
195	Mar 2							.0056	.0048			.0000	.1936		8.40	3.40	5.00	2.0	.80	
232	10							.0056	.0038			.0000	.1861						.75	
250	17							.0008	.0036			.0000	.2299						.80	
280	24							.0064	.0118			.0000	.4277						.70	
304	31							.0096	.0090			.0000	.2227						.80	
340	Apl 7							.0034	.0106			.0000	.1619		7.30	3.80	3.50		.70	
365	14							.0072	.0118			.0000	.2082						.80	
413	30							.0033	.0059			.0000	.2443						.80	
447	May 6	55°	clear	none	normal		none	.0012	.0070			.0000	.2296		8.20	4.20	4.00		.65	
472	14	53°	clear	none	normal		none	.0026	.0024			.0000	.3602						.75	
515	20	59°	clear	none	sl. straw		sl. marshy	.0028	.0040			.0000	.2118						.80	
559	27	36°	clear	none	normal		sl. marshy	.0020	.0076			.0000	.1960						.80	
596	June 4	63°	clear	none	normal		sl. marshy	.0052	.0056			.0000	.1992		9.20	4.70	4.50		.80	
627	9		clear	none	normal		sl. marshy	.0032	.0084			.0000	.2009						.75	
675	16	68°	clear	none	normal		sl. marshy	.0018	.0077			.0000	.1632						.80	
702	July 15	75°	v. slight	v. slight		dist. veg	v. faintly veg	.0062	.0278			.0001							0.78	
728	21	64°	v. slight	v. slight	0.10	none	none	.0044	.0070			.0001	.1100						0.73	
754	29	61°	v. slight	v. slight	0.07	faintly veg	faintly veg	.0040	.0084			.0001	.1100	0.15	7.70	2.90	4.80	2.1	0.77	
787	Aug 4	64°	none	v. slight	0.12	faintly veg	faintly veg & unpl'sant	.0012	.0070			.0001	.0850	0.13	6.60			1.6	0.73	.0140
829	11	62°	none	none	0.00	none	none	.0034	.0040			.0001	.1000	0.02	7.10			2.5	0.77	.0100
872	18		none	v. slight	0.07	none	none	.0036	.0052			.0001	.0800	0.08	7.60			1.7	0.73	.0120
915	25	62°	v. slight	v. slight	0.06	none	faintly veg	.0024	.0040			.0001	.0770	0.06	7.30			2.3	0.74	.0120
956	31	61°	none	v. slight	0.05	none	faintly mouldy	.0036	.0044			.0001	.0950	0.05	7.00			2.3	0.72	.0150
991	Sept 15	59°	none	v. slight	0.05	v. faintly veg	v. faintly veg	.0060	.0068			.0002	.1300	0.06	7.80			2.3	0.73	.0100
1029	28	56°	none	v. slight	0.00	none	none	.0032	.0038			.0000	.1400	0.02	7.00			1.8	0.73	.0120

NOTE.—Samples numbered 66, 84, 116, 139, 173, 280, 304. 340 and 365 were unmixed pond water. Samples numbered 195, 250, 413, 447, 472 and 829 were unmixed driven-well water. Samples numbered 515, 559, 702, 728, 754, 787, 872, 915, 956, 991 and 1029 were mixtures of pond and well water. Samples numbered 5, 12, 37, 232, 596, 627 and 675 consisted of water whose exact source could not be ascertained.

CHEMICAL EXAMINATION OF WATER FROM WATT'S POND ; INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	APPEARANCE			ODOR		AMMONIA				NITROGEN AS		Oxygen Consumed	RESIDUE ON EVAPORATION			Hardness	Chlorine	Iron
			Turbidity	Sediment	Color	Cold	Hot	Free	ALBUMINOID Total	In Solution	In Suspension	Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
873	Aug 18	...	v. slight	v. slight	0.12	faintly veg..........	v. faintly veg.	.0042	.0060	.0056	.0004	.0001	.0770	0.13	6.60	1.80	4.80	1.7	0.66	.....
916	25	62°	v. slight	v. slight	0.12	v. faintly veg........	faintly veg...........	.0018	.0066	.0064	.0002	.0001	.0670	0.11	....	...	....	1.6	0.69	... .
1031	Sept 29	52°	v. slight	cons. ..	0.07	faintly veg..........	faintly veg....... ..	.0028	.0076	.0052	.0024	0000	.0930	0.07	.....	...	...	1.6	0.64	.. .

MICROSCOPICAL EXAMINATION OF WATER FROM WATT'S PUMPING STATION; TAP. (No. per c. c.) TABLE

Number	27	53	87	106	126	145	176	199	256	290	319	330	366
Date of Collection	1897 Jan 14	Feb 3	Mch 2	Mch 17	Mch 24	Mch 31	Apl 7	Apl 14	Apl 30	May 6	May 14	May 17	May 20
Temperature								55°	64°	55°	53°	65°	59°
Diatomaceæ		37	4		6	11	14	16	4	3	1	3	7
Asterionella													
Eunotia		14					5						
Melosira													
Meridion								6					
Navicula		7				6							
Tabellaria		8											
Synedra													
Cyanophyceæ						2	1	3					
Algæ						2	3						
Fungi			pres	pres	pres			pres	pres	pres	pres	pres	
Infusoria		2			4	1	1						
Dinobryon													
Vermes													
Total Organisms		39	4		10	16	19	19	4	3	1	3	7
Total Genera	7	6	1	1	7	7	9	8	2	2	2	2	3

Number	413	450	481	529	555	574	600	626	659	701	744	787	823	859	897
Date of Collection	May 29	J'ne 4	J'ne 9	J'ne 16	July 8	July 15	July 21	July 28	Aug 4	Aug 11	Aug 18	Aug 25	Aug 31	Sept 5	Sept 28
Temperature	60°	63°		68°	76°	75°	64°	61°	64°	65°	...	69°	61°	59°	59°
Diatomaceæ	66	5	7	9	3	32	1			2	3			3	
Asterionella						23									
Eunotia															
Melosira	61														
Meridion															
Navicula															
Tabellaria															
Synedra				6											
Cyanophyceæ						1			1						
Algæ												1			1
Fungi					pres	pres	pres	albd	pres	pres	pres	pres			pres
Infusoria	12		2	1		1		4	4			1			2
Dinobryon	8														
Vermes											1				
Total Organisms	78	5	9	10	3	34	1	4	5	2	4	2	0	3	3
Total Genera	6	3	6	4	3	8	2	3	3	2	3	3	0	1	3

BACTERIAL EXAMINATION OF WATER FROM WATT'S PUMPING STATION; TAP. (No. per c. c.) TABLE

Bacteria	560	460	5	39	3300	800	415	440	6	61	93	..	100
Rain-fall in inches week preceding	.00	1.30	.06	1.21	1.22	.18	.62	1.50	.08	1.40	2.94	3.01	.87
Date	Jan 16	Feb 6	Mch 6	Mch 20	Mch 27	Apl 3	Apl 10	Apl 17	May 1	May 8	May 15	May 22	May 22
Mean temperature week ending	29°	27°	35°	35°	42°	42°	47°	47°	53°	54°	60°	60°	60°
	?	pd.	d.w.	d.w.	pd.	pd.	pd.	pd.	d.w.	d.w.	d.w	d.w.	¼pd

Bacteria	94	160	Liq	60	...	...	250	700	135	145	150	1500	230	158	30
Rain-fall in inches week preceding	.59	1.74	1.18	.99	.75	4.37	2.21	2.42	2.31	1.14	.58	1.50	.80	.00	1.17
Date	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°
	1/10 pd.	Mixed	?	?	Mixed	⅓pd	⅓pd.	⅓pd	⅓pd.	d.w.	⅓pd.	⅓pd.	¼pd.	⅓pd.	⅓pd.

MICROSCOPICAL EXAMINATION OF WATER FROM

WATT'S POND; INLET.

(No. per c. c.) TABLE

Number	745	788	899
Date of Collection	1897 Aug 18	Aug 25	Sept 29
Temperature	....	62°	52°
Diatomaceæ	1	1	6
Algae	....	1	2
Infusoria	6	1	1
Dinobryon	5	....	....
Total Organisms	7	3	9
Total Genera	3	3	8

BACTERIAL EXAMINATION OF WATER FROM

WATT'S POND: INLET. TABLE

Bacteria	1600	4000	1500
Meteorological Statistics.			
Rain-fall in inches week preceding	.58	1.35	1.17
Date	Aug 21	Aug 28	Oct 2
Mean temperature week ending	73°	70°	60°

CHEMICAL EXAMINATION OF WATER FROM CLEAR STREAM POND; GATE HOUSE. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
10	Dec 17							.0054	.0088			.0000	.2756		7.60	2.60	5.00	2.0	.75	
	1897																			
36	Jan 6							.0006	.0092			.0000	.3618						.80	
65	27							.0003	.0073			.0014	.4431		6.20	2.80	3.40		.75	
82	Feb 3							.0022	.0056			.0010	.4419						.75	
114	9							.0006	.0060			.0014	.4428						.80	
137	16							.0026	.0074			.0014	.3918						.70	
171	25							.0024	.0080			.0014	.0872						.80	
193	Mar 2							.0056	.0090			.0014	.3622		10.20	5.30	4.90	2.5	.70	
230	10							.0040	.0064			.0016	.3410						.70	
248	17							.0030	.0074			.0016	.3747						.75	
278	24							.0032	.0098			.0014	.2101						.80	
302	31							.0042	.0110			.0014	.2751						.85	
338	Apl 7							.0036	.0116			.0014	.3568		9.90	5.40	4.50		.75	
364	14							.0022	.0078			.0014	.2933						.75	
395	23							.0078	.0152			.0018	.2718						.85	
412	30			veg.	normal		fishy	.0036	.0159			.0020	.3174						.75	
445	May 6	64°	sl. turb.	md. veg	normal		marshy	.0048	.0182			.0020	.4552		9.80	4.80	5.00		.75	
471	14	56°	sl. turb.	none	sl. straw		offen veg.	.0130	.0225			.0020	.2673						.85	
514	20	61°	sl. turb.	con. veg	sl. straw		offen veg.	.0088	.0232			.0024	.2045						.90	
558	27	60°	sl. turb.	none	normal		offensive	.0070	.0235			.0024	.3542						.80	
594	June 4	65°	sl. turb.	sl. veg.	sl. straw		md. veg.	.0088	.0187			.0026	.2207		9.50	5.20	4.30		.90	
626	9	55°	clear	none	sl. straw		sl. veg	.0096	.0119			.0024	.2038						.75	
674	16	68°	clear	sl. veg.	normal		md. veg.	.0100	.0180			.0044	.2179						.75	
701	July 15	65°	v. slight	v. slight		dist. veg & unpleasant	faintly veg & unpl'sant	.0098	.0178			.0019							.83	
727	21	64°	v. slight	v. slight	0.20	dist. veg.	faintly veg	.0048	.0124			.0030	.2300						.81	
753	29	60°	v. slight	v. slight	0.07	faintly veg. & marshy.	dist. veg	.0068	.0138			.0016	.2100	0.23	9.90	4.60	5.30	2.2	.83	
785	Aug 4	65°	v. slight	v. slight	0.14	dist. veg & unpleasant	dist veg & unpl'sant	.0034	.0096	.0096	.0000	.0028	.2800	0.13	10.40	5.40	5.00	2.2	.83	
828	11	66°	v. slight	cons.	0.12	dist. veg & disagr'ble	dist. veg & disagr'ble	.0056	.0128	.0098	.0030	.0032	.1800	0.17	8.60	3.20	5.40	2.2	.83	
871	18		v. slight	cons.	0.15	faintly veg & disagr'ble	faintly veg & unpl'sant	.0106	.0110	.0086	.0024	.0036	.3000	0.15	11.00	3.00	8.00	1.9	.84	
914	25	64°	none	cons.	0.14	faintly veg & disgr'ble	faintly veg & disagr'ble	.0046	.0126	.0084	.0042	.0032	.3250	0.13	9.20	3.70	5.50	2.5	.83	
954	31	54°	v. slight	slight	0.12	faintly veg & marshy	dist. veg. & marshy	.0050	.0124	.0088	.0036	.0027	.2500	0.13	9.60	3.70	5.90	2.5	.80	
990	Sept 15	61°	v. slight	slight	0.15	faintly veg & disagr'ble	faintly veg & disagr'ble	.0026	.0112	.0102	.0010	0036	.3350	0.16	9.70	2.80	6.90	2.9	.83	.0070
1027	28	60°	none	v. slight	0.10	faintly veg.	faintly veg & unpl'sant	.0022	.0100	.0088	.0012	.0014	.3350	0.14	9.10	3.60	5.50	2.1	.78	.0050

CHEMICAL EXAMINATION OF WATER FROM CLEAR STREAM POND; EAST INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																			
513	May 20	59°	sl. turb.	con. veg	sl. straw..	.....	md. veg	.0004	.0436	...	.....	.0000	.2631	...	.....	....	..	....	.75	.....
557	27	56°	md. turb	con earth	md. straw	...	sl. veg	.0060	.1320	...	.....	.0000	.3245	...	.....	....	....	...	.90	....
625	June 9	53°	sl. turb.	con. veg	sl. straw..	...	sl. veg	.0054	.0566	.....	.....	.0000	.2261	...	.. .	....	....	...	1.00	.....
673	16	60°	clear ..	sl. veg..	normal...	.....	sl marshy........	.0014	.0281	...	.....	.0000	.2459	..	....	...	....	...	1.00	.....

CHEMICAL EXAMINATION OF WATER FROM CLEAR STREAM POND; WEST INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
512	May 20	60°	sl. turb.	sl. veg..	sl. straw..	.....	offen veg.	.0022	.0608	....	.....	.0000	.2123	....	.....	....	....	....	.75	....
556	27	59°	clear .	sl. veg..	normal...	.....	sl. veg..........	.0030	.0207	...	.....	.0000	.3599	....	...	...	....	...	.75	.....
624	June 9	54°	sl. turb.	con. veg	sl. straw..	.....	sl. veg...	.0050	.0470	...	.....	.0000	.2759	....	.....	....	....	...	.75	.....
672	16	60°	clear ..	con. veg	normal...	.....	sl. marshy........	.0006	.0294	....	....	.0000	.2136	....	...	...	..	...	.75	.....
827	Aug 11	62°	v. slight	cons. ..	0.09	faintly veg & marshy.	faintly veg	.0012	.0062	.0052	.0010	.0001	.3800	0.09	.. ..	...	....	2.2	.70	.....
870	18	....	none...	cons..	0.07	v. faintly veg.......	v. faintly veg.......	.0100	.0074	.0054	.0020	.0001	.2750	0.07	11.30	4.80	6.50	1.6	.69	.....
913	25	64°	none...	cons. ..	0.06	faintly veg...	faintly veg	.0018	.0126	.0058	.0068	.0001	.3750	0.08	.....	....	...	2.1	.73	....
1030	Sept 29	51°	v. slight	v. slight	0.03	faintly veg.........	faintly veg	.0014	.0076	.0048	.0028	.0000	.4000	0.06	.....	....	....	1.9	.69	....

MICROSCOPICAL EXAMINATION OF WATER FROM CLEAR STREAM; GATE HOUSE. (No. per c.c.) TABLE

Number	6	26	52	63	72	86	125	144	174	198	227	255	288	318	329	365	412	448	480	528	554	573	599	625	657	700	743	786	821	858	895
Date of Collection	1896 Dec 25	1897 Jan 14	Febr 3	Febr 9	Febr 16	Mar 2	Mar 24	Mar 31	Apl 7	Apl 14	Apl 23	Apl 30	May 6	May 14	May 17	May 20	May 27	June 4	June 9	June 16	July 9	July 15	July 21	July 28	Aug 4	Aug 11	Aug 18	Aug 25	Aug 31	Sept 15	Sept 28
Temperature										54°	54°	60°	...	56°	59°	61°	64	65°	55°	68°	74°	65°	64°	60°	65°	62°	.	64°	64°	61°	58°
Diatomaceæ			4	14	20	20	4	6	5	367	9	7	Lost	14	12	11	14°	2	19	9	63	2	17	5	4	..	10	21	8	20	4
Fragilaria										8																					
Melosira										33									7	5	6										
Meridion																					5										
Navicula				6	12	8		5						7	7	5	5		7		31						8	5		16	
Nitzschia						6																									
Synedra										25											12		8					11			
Tabellaria																					5										
Cyanophyceæ												1			1	1		1		2				1					1		
Algæ				8	4	22	6	1	1	7	1	6		5	3	13	3	2	3	1	8	1	1	3			1				
Scenedesmus				8		14																									
Spirogyra												5				9															
Ulothrix						8																									
Fungi						2	1							2					1												
Rhizopoda								1							1																
Infusoria				6	4	2	2	1							1										1						4
Vermes							1														1										
Total Organisms			4	28	28	46	11	9	6	374	10	14		21	18	25	17	5	23	12	72	3	18	9	5	0	11	21	9	20	8
Total Genera	2	5	2	8	7	8	5	5	4	9	6	8		11	9	8	6	4	9	6	11	3	7	5	2	0	4	5	4	2	6

BACTERIAL EXAMINATION OF WATER FROM CLEAR STREAM; GATE HOUSE. (No. per c.c.) TABLE

Bacteria	1000	1220	1485	lost	2700	1300	6000	800	1200	1000	1500	2500	480	3900	...	1400	350	1500	4200	1800	...	...	1200	5000	1200	3300	2100	2800	2700	1500	1700
Meteorological Statistics																															
Rain-fall in inches week preceding	.50	.00	1.30	1.10	1.07	.06	1.22	.18	.62	1.50	.49	.08	1.40	2.94	3.01	.87	.95	1.74	1.18	.99	.75	4.37	2.21	2.42	2.31	1.14	.58	1.50	.80	.00	1.17
Date	Jan 2	Jan 16	Febr 6	Febr 13	Febr 20	Mar 6	Mar 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 22	May 29	June 5	June 12	June 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	29°	29°	27°	33°	34°	35°	42°	42°	47°	47°	46°	53°	54°	60°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the genera tabulated above, as occurring in quantities of five or more per C. C. in any one sample, the following were also found: ***Diatoms***—Cyclotella, Cymbella, Eunotia, Gomphonema, Nitzschia, Surirella; ***Cyanophyceæ***—Anabæna, Microcystis, Oscillaria; ***Algæ***—Cosmarium, Desmidium, Hyalotheca, Protococcus, Raphidium, Staurastrum, Zygnema; ***Infusoria***—Cryptomonas, Dinobryon, Monas, Synura; ***Vermes***—Anguillula, Rotifer; ***Fungi***—Molds.

MICROSCOPICAL EXAMINATION OF WATER FROM CLEAR STREAM POND.

(No. per c.c.) TABLE

	West Inlet								East Inlet			
Number	362	409	478	526	699	742	785	898	363	410	479	527
Date of Collection	1897 May 20	May 27	J'ne 9	J'ne 16	Aug 11	Aug 18	Aug 25	Sept 29	May 20	May 27	J'ne 9	J'ne 16
Temperature	60°	59°	54°	60°	62°	....	64°	51°	59°	56°	53°	60°
Diatomaceæ	89	1340	39	20	5	4	17	10	36	47	47	18
Achnanthes	5	...	.	...	..	..	...	....	...	..	..	...
Cyclotella	...	...	....	...	...	..	....	...	...	..	23	...
Cymbella	18	...	..	...	....	....	....	....	..	..	.. .	...
Eunotia	19	....	....	....	...	...	....	....	....	9	5	7
Melosira	11	1266	25	....	...	....	. .	....	....	..	....	...
Meridion	5	....	..	...	....	...	....	....	....	..	....	. ..
Navicula	25	55	12	9	....	....	15	10	9	27	9	5
Synedra	. .	...	...	7	..	....	.	...	11	10	9	....
Tabellaria	5	8	...	...	..	....	..	...	10	...	....	....
Cyanophyceæ	1	...	2	1	....	...	...	..	2	....	...	....
Algæ	2	1	....	1	....	....	...	..	1	...	....	.
Fungi	1	1	1	4	....	...	. .	....	1	20	....	. ..
Rhizopoda	...	1	....	...	....	...	..	....	....	....	....	...
Infusoria	..	....	1	...	....	1	...	1	..	....		...
Vermes	...	..	....	...	....	1	....	....	...	...	....	....
Total Organisms	93	1343	43	26	5	6	17	11	40	67	47	18
Total Genera	11	11	7	7	3	4	3	2	11	5	5	5

BACTERIAL EXAMINATION OF WATER FROM CLEAR STREAM POND.

(No. per c.c.) TABLE

	West Inlet								East Inlet			
Bacteria	7500	300	19000	2200	6400	4100	1500	2800	1800	500	900	1600
Meteorological Statistics.												
Rain-fall in inches week preceding	.87	.95	1.18	.99	1.14	.58	1.35	1.17	.87	.95	1.18	.99
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	Oct 2	May 22	May 29	J'ne 12	J'ne 19
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	60°	60°	60°	61°	68°

CHEMICAL EXAMINATION OF WATER FROM TWIN PONDS (SIMONSON'S); GATE HOUSE. (Parts per 100,000.)

No.	Date of Collection	Tem.	APPEARANCE: Turbidity	Sediment	Color	ODOR: Cold	Hot	AMMONIA: Free	Albuminoid: Total	In Solution	In Suspension	NITROGEN AS: Nitrites	Nitrates	Oxygen Consumed	RESIDUE ON EVAPORATION: Total	Loss on Ignition	Fixed	Hardness	Chlorine	Iron
	1896																			
21	Dec 22	...	...	...	...	...	...	.0000	.0086	...	...	.0000	.3788	...	9.10	5.60	3.50	1.7	.85	...
	1897																			
35	Jan 6	...	...	...	...	...	...	.0006	.0028	...	...	.0000	.2795	...	...	...	...	...	.85	...
64	27	...	...	...	...	...	...	.0008	.0032	...	...	.0000	.4605	...	8.00	3.00	5.00	...	.85	...
92	Feb 4	...	...	...	...	...	...	.0000	.0030	...	...	.0000	.3780	...	...	...	...	...	.70	...
113	9	...	...	...	...	...	...	.0043	.0067	...	...	.0000	.3588	...	...	...	...	...	.70	...
136	16	...	...	...	...	...	...	.0018	.0054	...	...	.0000	.3773	...	...	...	...	...	.55	...
175	26	...	...	...	...	...	...	.0019	.0067	...	...	.0000	.4431	...	...	...	...	...	.85	...
192	Mar 2	...	...	...	...	...	...	.0040	.0034	...	...	.0000	.3920	...	11.30	5.30	6.00	2.8	.70	...
229	10	...	...	...	...	...	...	.0014	.0080	...	...	.0008	.2180	...	...	...	...	...	.75	...
247	17	...	...	...	...	...	...	.0012	.0048	...	...	.0004	.2951	...	...	...	...	...	.80	...
277	24	...	...	...	...	...	...	.0050	.0086	...	...	.0024	.2241	...	...	...	...	...	.75	...
301	31	...	...	...	...	...	...	.0034	.0056	...	...	.0034	.3397	...	...	...	...	...	.85	...
337	Apl 7	...	...	...	...	...	...	.0058	.0074	...	...	.0100	.3205	...	8.60	4.40	4.20	...	.60	...
348	8	...	...	...	...	...	...	.0058	.0042	...	...	.0112	.3299	...	9.60	4.60	5.00	...	.85	...
363	14	...	...	...	...	...	...	.0014	.0066	...	...	.0092	.3355	...	...	...	...	...	.85	...
394	23	...	...	...	...	...	...	.0054	.0091	...	...	.0120	.2147	...	...	...	...	...	.90	...
411	30	...	...	...	normal	...	marshy	.0040	.0055	...	...	.0080	.2028	...	...	...	...	...	.85	...
444	May 6	64°	clear	sl. veg.	normal	...	marshy	.0054	.0101	...	...	.0128	.3616	...	9.40	5.00	4.40	...	.85	...
470	14	59°	sl. turb.	none	normal	...	offen. veg	.0095	.0140	...	...	.0072	.1991	...	...	...	...	...	.80	...
509	20	63°	sl. turb	none	sl. straw	...	offen. veg	.0104	.0121	...	...	.0092	.2705	...	...	...	...	...	.85	...
553	27	61°	opales't	none	normal	...	sl. veg.	.0122	.0148	...	...	.0052	.3471	...	...	...	...	...	.80	...
593	June 4	64°	sl. turb.	none	sl. straw	...	sl. veg.	.0160	.0175	...	...	.0028	.1981	...	13.60	7.90	5.70	...	.80	...
621	9	57°	clear	none	sl. straw	...	md veg.	.0052	.0093	...	...	.0006	.2092	...	...	...	...	...	.85	...
669	16	68°	clear	none	normal	...	sl. veg.	.0050	.0145	...	...	.0014	.2415	...	...	...	...	...	.80	...
700	July 15	76°	dist.	slight	...	dist. veg	v. faintly veg	.0114	.0274	...	...	.0007	...	...	...	...	...	...	0.98	...
726	21	73°	v. slight	slight	0.09	faintly veg	v. faintly veg	.0022	.0084	...	...	.0018	.2400	...	...	...	...	...	0.83	...
752	29	64°	v. slight	v. slight	0.03	faintly veg	faintly veg	.0022	.0110	...	...	.0007	.2400	0.14	11.00	5.50	5.50	2.5	0.88	...
784	Aug 4	74°	v. slight	v. slight	0.12	faintly veg	v. faintly veg.	.0028	.0078	.0068	.0010	.0014	.2100	0.05	9.30	2.80	6.50	2.3	0.86	...
825	11	72°	v. slight	v. slight	0.09	v. faintly veg	faintly veg.	.0006	.0056	.0056	.0000	.0018	.2100	0.10	8.10	2.40	5.70	2.2	0.86	...
868	18	...	none	v. slight	0.07	faintly veg	v. faintly veg.	.0012	.0070	.0070	.0000	.0016	.2350	0.07	10.70	3.30	7.40	2.1	0.88	...
911	25	70°	none	v. slight	0.06	faintly veg.	faintly veg.	.0006	.0074	.0068	.0006	.0018	.2150	0.08	9.00	3.20	5.80	2.5	0.83	...
953	31	73°	none	slight	0.05	faintly veg	faintly veg. & mouldy.	.0024	.0088	.0080	.0008	.0022	.2500	0.07	10.00	3.30	6.70	2.3	0.86	...
989	Sept 15	68°	v. slight	v. slight	0.07	faintly veg	faintly veg	.0012	.0104	.0088	.0016	.0030	.2500	0.10	10.00	2.50	7.50	2.9	0.83	.0200
1025	28	60°	v. slight	v. slight	0.05	v. faintly veg	faintly veg	.0006	.0064	.0064	.0000	.0012	.3350	0.06	8.80	3.60	5.20	2.1	0.88	.0050

CHEMICAL EXAMINATION OF WATER FROM TWIN PONDS (SIMONSON'S); INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
511	May 20	62°	sl. turb.	cons. veg.	sl. straw..	....	offen. veg	.0026	.0114	....	...	.0000	.2779	....	..	...	....	....	.85	.....
555	27	61°	clear ...	sl. veg..	normal...	....	sl. veg............	.0036	.0334	.....	..	.0000	.2935	....	....	....	....	....	.85	.....
623	June 9	54°	clear...	none...	sl. straw..	....	sl. veg.	.0030	.0090	.. .	.....	.0002	.5573	....	..	.	....	....	.85	. ...
671	16	65°	clear...	cons. veg.	normal...	....	sl. marshy..........	.0004	.0126	.....	..	.0002	.2465	....	.....	....	..	....	.80	.....
826	Aug. 11	62°	v. slight	cons. ..	0.08	faintly veg. & marshy.	faintly veg..........	.0006	.0066	.0036	.0030	.0005	.2400	0.08	....	...	..	2.2	.83	.....
869	18	...	v. slight	cons...	0.06	faintly veg. & unpl'sant	faintly veg	.0022	.0054	.0044	.0010	.0004	.2200	0.04	10.20	2.80	7.40	2.1	.83	....
912	25	65°	none. .	cons. ..	0.06	faintly veg. & unpl'sant	faintly veg....	.0012	.0060	.0050	.0010	.0005	.3000	0.05	.....	...	...	2.3	.83	.....
1026	Sept. 28	60°	slight..	heavy..	0.07	faintly veg. & unpl'sant	faintly veg & unpl'sant	.0032	.0372	.0044	.0328	.0002	.4250	0.06	....	....	....	2.3	.83	....

MICROSCOPICAL EXAMINATION OF WATER FROM TWIN POND; GATE HOUSE. (No. per c. c.) TABLE

Number	19	43	57	62	71	124	143	173	197	226	254	288	317	358	405	447	475	523	553	572	598	624	656	697	740	783	820	857	893
Date of Collection	1897 Jan 11	Jan 22	Feb 4	Feb 9	Feb 16	Mch 24	Mch 31	Apl 7	Apl 14	Apl 23	Apl 30	May 6	May 14	May 20	May 27	J'ne 4	J'ne 9	J'ne 16	July 9	July 15	July 21	July 28	Aug 4	Aug 11	Aug 18	Aug 25	Aug 31	Sept 15	Sept 28
Temperature	....	...	....	....	....	....	....	....	56°	56°	61°	64°	59°	63°	61°	64°	57°	68°	77°	76°	73°	64°	74°	72°	...	70°	73°	68°	60°
Diatomaceæ	..	28	8		12	2	2	4	1	4	4	72	17	11	10	31	10	5	27	19	20	30	12	3	61	23	6	2	9
Melosira	....	....	....		...	....	..	....	....	....	....	53	...	..	...	...	...	...	....	...	....	...	....	....	39	....	...	....	....
Navicula	....	14	6		8	..	...	....	...	.	....	14	....	9	...	12	8	....	6	. ..	....	5	...	....	..	...	....	....	...
Nitzschia	...	...	..		....	....	.. .	....	..	....	....	...	..	....	....	....	....	..		.		..	...	..	....	7	....	..	....
Synedra	...	10	....		..	....	....	....	....	...	....	....	9	....	....	9	...	....	16	14	19	22	12	....	19	12	5	..	5
Cyanophyceæ	..	....	....		.. .	...	...	...	1	1	3	1	6	6	4	6	2	....	...	1	...	...	...	....	2	....	....	....	....
Oscillaria	...	....	....		.	....	...	...	....	..	..		6	6	..	6	...	...	...	..	....	....	...	....	....	....		....	..
Algæ	..	...	2		...	....	3	1	23	....	1	9	3	2	1	3	5	2	2	3	....	. ..	..	...	10	21	4	11	1
Pandorina	....	....	..		..	....	...	....	...	...	....	..	....	.	.	...	...	....	....	...	....	....	...	..	....	12	....	. .	...
Protococcus	....	...	..	Lost	.	..	....	....	22	..	....	..	...	....	....	..	...	...	...	..	... .	. .	....	...	...	...	....	....	...
Raphidium	....	....	...		..	...	....	....	...	....	...	6	....	...	....	....	...	...	...	....	....	...	....	....	...	6	...	9	....
Fungi	...	....	..		....	.. .	....	..	....	....	2	....	1	..	...	3	...	....	....	....	....	...	....	....	..	....	1	...	....
Rhizopoda	..	.	....		..	....	....	...	....	...	..	....	....	....	..	..	.	.	....	....	...	..	1	..	...	..	...	...	..
Infusoria	....	....	....		....	1	...	1	....	....	....	5	..	....	..	..	..	.	....	..	45	...	5	....	26	86	1	34	....
Cryptomonas	....	....	...		....	....	....	...	..	..	..	...	.	....	....	...	.	...		...	....	..	..	....	....	....	...	5	
Dinobryon	....	....	. ..		...	....	....	...	.	.	...	...	....	....	...	...	..	...	....	....	...	.	..	..	..	61	...	....	..
Dinobryon Cases	...	....	..		..	.. .	....	...	..	....	..	..	....	..	..	...	...	...	....	....	....	....	...	..	...	....	....	12	...
Monas	....	....	.		..	...	...	...	....	....	....	5	...	...	....	...	.	..	...	.	44	....	..	...	22	20	....	14	....
Total Organisms	....	28	10		12	5	3	6	25	5	10	87	27	19	15	43	17	7	29	23	65	30	18	3	99	130	12	47	10
Total Genera	6	4	3		3	3	2	6	4	4	6	9	9	4	6	10	6	3	6	6	4	3	4	2	15	11	6	7	3

BACTERIAL EXAMINATION OF WATER FROM TWIN POND; GATE HOUSE. (No. per c. c.) TABLE

Bacteria	770	48700	1200	28800	600	7100	1700	600	2300	400	1000	3200	9000	700	700	3000	16000	1800	....	....	1200	2000	400	2300	700	3800	4600	300	3400
Meteorological Statistics.																													
Rain-fall in inches week preceding	.81	2.18	.46	1.10	1.07	1.22	.18	.62	1.50	.49	.08	1.40	2.94	.87	.95	1.74	1.18	.99	.75	4.37	2.21	2.42	2.31	1.14	.58	1.50	.80	.00	1.17
Date	Jan 16	Jan 23	Feb 6	Feb 13	Feb 20	Mch 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	29°	31°	27°	33°	34°	42°	42°	47°	47°	46°	53°	54°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the genera tabulated above as being found in quantities of five or more per C.C, in any one sample, the following were also found: ***Diatoms***—Achnanthes, Cyclotella, Cymbella. Eunotia, Fragillaria, Meridion, Tabellaria. Pleurosigma. ***Cyanophyceæ***—Anabaena. ***Algæ***—Arthrodesmus, Closterium, Dictyosphaerium, Scenedesmus. Staurastrum, Zygnema. ***Rhizopoda***—Actinophrys. ***Infusoria***—Euglena, Glenodinium, Trachelomonas. ***Fungi***—Molds. ***Miscellaneous***—Amorphous matter.

MICROSCOPICAL EXAMINATION OF WATER FROM TWIN PONDS; INLET.

(No. per c. c.) TABLE

Number	360	407	477	525	690	741	784	894
Date of Collection	1897 May 20	May 27	J'ne 9	J'ne 16	Aug 11	Aug 18	Aug 25	Sept 28
Temperature	62°	61°	54°	65°	62°	..	65°	63°
Diatomaceæ	31	66	27	23	9	88	19	79
Meridion	..	7	....	...	....	....	.	..
Melosira	...	....	8	...	..	.	...	..
Navicula	22	53	15	....	....	54	11	18
Synedra	....	...	....	..	6	25	....	54
Cyanophyceæ	5	17	1	....	....	....	..	1
Oscillaria	5	16	...	..	....	...	...	...
Algæ	6	....	2	2	....	2	2	2
Fungi	..	1	....	....	...	...	....	...
Infusoria	....	...	1	...	....	....	3	2
Vermes	...	1	...	....	...	..	...	....
Total Organisms	42	85	31	25	9	90	24	84
Total Genera	8	11	8	5	2	8	7	9

BACTERIAL EXAMINATION OF WATER FROM TWIN PONDS; INLET.

(No. per c. c.) TABLE

Bacteria	1800	700	12500	2100	5600	500	1000	3400
Meteorological Statistics.								
Rain-fall in inches week preceding	.87	.95	1.18	.99	1.14	.58	1.35	1.17
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	Oct 2
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	60°

CHEMICAL EXAMINATION OF WATER FROM SPRINGFIELD POND; PUMPING STATION. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
4	1896 Dec 15	....	....	....	....	....	....	.0050	.0088	....	....	.0000	.2429	....	9.50	4.50	5.00	2.2	1.00	....
34	1897 Jan 6	....	....	....	....	....	....	.0038	.0068	....	....	.0000	.1615	....	....	....	....	....	.85	....
51	19	....	....	....	....	....	....	.0118	.0042	....	....	.0000	.2867	....	9.30	3.30	6.00	....	1.00	....
90	Feb 4	....	....	....	....	....	....	.0060	.0086	....	....	.0000	.2750	....	....	....	....	....	.95	....
111	9	....	....	....	....	....	....	.0086	.0096	....	....	.0000	.3224	....	....	....	....	....	1.00	....
134	16	....	....	....	....	....	....	.0058	.0042	....	....	.0006	.2910	....	....	....	....	....	1.00	....
169	25	....	....	....	....	....	....	.0040	.0066	....	....	.0004	.2763	....	....	....	....	....	1.00	....
190	Mar 2	....	....	....	....	....	....	.0038	.0110	....	....	.0000	.2911	....	11.90	4.70	7.20	3.6	.95	....
227	10	....	....	....	....	....	....	.0054	.0088	....	....	.0004	.2093	....	....	....	....	....	1.00	....
245	17	....	....	....	....	....	....	.0060	.0078	....	....	.0002	.2748	....	....	....	....	....	.85	....
275	24	....	....	....	....	....	....	.0036	.0234	....	....	.0000	.2512	....	....	....	....	....	.95	....
282	29	....	....	....	....	....	....	.0022	.0088	....	....	.0012	.2770	....	9.80	4.10	5.70	2.6	1.10	....
299	31	....	....	....	....	....	....	.0040	.0140	....	....	.0006	.2926	....	....	....	....	....	.95	....
335	Apl 7	....	....	....	....	....	....	.0040	.0170	....	....	.0012	.2590	....	10.80	5.40	5.40	....	1.10	....
362	14	....	....	....	....	....	....	.0008	.0137	....	....	.0004	.1801	....	....	....	....	....	1.05	....
393	23	....	....	....	....	....	....	.0102	.0198	....	....	.0000	.1563	....	....	....	....	....	.60	....

NOTE.—Samples numbered 4, 34, 90 and 111 were collected from the pump well. Samples numbered 51, 134, 169, 190, 227, 245, 275, 282, 299, 335, 362 and 393 were collected from the tap in the pumping station.

CHEMICAL EXAMINATION OF WATER FROM SPRINGFIELD POND; OVERFLOW. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																			
725	July 21	74°	slight..	cons...	0.80	dist. veg. & disagr'ble	dist. veg. & disagr'ble.	.0198	0354	.....	.....	.0040	.0450	....	....	..	....	3.9	1.15	....
751	29	65°	slight..	cons...	0.75	dist. veg. & unpleas't	dist. veg...........	.0386	.0338	. . .	.....	.0023	.1050	0.48	11.30	4.30	7.00	3.4	1.15	. ..
782	Aug 4	74°	slight .	cons..	0.40	dist. veg.....	dist. veg. & aromatic .	.0152	.0236	.0190	.0046	.0024	.0730	0.23	10.00	2.00	8.00	3.0	1.10	. ..
824	11	75°	v. slight	cons...	0.27	dist. veg...........	dist. veg. & fishy....	.0008	.0220	.0180	.0040	.0020	.0930	0.27	9.70	2.70	7.00	3.0	1.10	. ...
867	18	..	v. slight	cons...	0.25	dist. veg	dist. fishy......... .	.0022	.0182	.0148	.0034	.0016	.0850	0.26	10.50	2.10	8.40	2.2	1.08	. ...
910	25	72°	v slight	cons. ..	0.30	dist. veg	dist. veg. & fishy....	.0006	.0256	.0204	.0052	.0014	.0730	0.34	9.70	3.00	6.70	3.1	1.14	....
951	31	78°	v. slight	slight..	0.32	faintly veg. & marshy.	faintly veg..........	.0016	.0152	.0140	.0012	.0014	.0950	0.27	10.30	3.00	7.30	3.2	1.13	.....
988	Sept 15	70°	v. slight	slight..	0.23	dist. veg. & marshy ..	faintly veg.........	.0020	.0168	.0152	.0016	.0018	.1250	0.17	11.00	2.30	8.70	3.6	1.13	.0100
1022	28	58°	v. slight	cons...	0.15	faintly veg...... ...	faintly veg. & unpleas't	.0012	.0122	.0110	.0012	.0007	.1100	0.12	8.80	2.90	5.90	2.7	1.08	.0120

CHEMICAL EXAMINATION OF WATER FROM SPRINGFIELD POND; INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	Turbidity	Sediment	Color	Odor: Cold	Odor: Hot	Ammonia: Free	Albuminoid: Total	In Solution	In Suspension	Nitrites	Nitrates	Oxygen Consumed	Residue: Total	Loss on Ignition	Fixed	Hardness	Chlorine	Iron
	1897																			
823	Aug 11	68°	v. slight	v. slight	0.30	dist. veg. & unpleas't.	dist. veg	.0022	.0170	.0146	.0024	.0012	.1200	0.33	10.00	2.80	7.20	3 0	1.12	....
866	18	..	v. slight	slight..	0.37	dist. veg. & unpleas't.	dist. veg	.0032	.0136	.0130	.0006	.0005	.0870	0.32	10.20	3.00	7.20	3.1	1.08	....
909	25	65°	v. slight	slight..	0.32	dist. veg. & unpleas't.	dist. veg	.0028	.0182	.0164	.0018	.0012	.1500	0.30	10.30	3.50	6.80	3.2	1.13	....
1023	Sept 28	56°	v. slight	cons. ..	0.15	faintly veg..........	faintly veg....... .	.0046	.0148	.0080	.0068	.0005	.2000	0.10	....	....	....	2.9	1.10	....

MICROSCOPICAL EXAMINATION OF WATER FROM SPRINGFIELD PUMPING STATION; TAP.

(No. per c. c.) TABLE

Number	18	36	42	56	70	78	105	123	128	142	171	196	225
Date of Collection	1897 Jan 11	Jan 19	Jan 22	Feb 4	Feb 16	Feb 26	Mch 17	Mch 24	Mch 29	Mch 31	Apl 7	Apl 14	Apl 23
Temperature	..	....	.	....	...	..	....	.....	..	..	..	60°	55°
Diatomaceæ	....	46	180	8	26	28	15	98	27	26	10	20	1
Eunotia	...	....	10	...	..	..	...	. .	...	..	...	....	.
Melosira	...	12	30	...	..	....	...	.....	....	8	...	9	....
Navicula	..	16	22	....	6	6	....	14	..	....	...	...	....
Tabellaria	..	14	42	..	.	...	9	. ..	....	8	7	...	....
Synedra	..	....	64	.	8	14	....	71	14	....	...	6	..
Cyanophyceæ	...	....	4	...	...	...	1	.....	....	1	....	1	...
Algæ	....	2	4	2	2	2	..	9	1	4		...	...
Fungi	....	..	....	...	....	4		1	..	1	...	....	..
Infusoria	..	2	2	..	4	8	..	1	...	..	2	3	1
Mallomonas	....	..	..	....	...	8	....	....	....	...	....	.. .	....
Vermes	. .	..	...	.	2	...	...	.....	...	...	...	...	....
Crustacea	..	..	..	..	..	....	. ..	....		1	....	....	....
Total Organisms	....	50	190	10	34	42	16	109	28	33	12	24	2
Total Genera	5	7	14	4	11	8	4	14	8	11	6	9	2

BACTERIAL EXAMINATION OF WATER FROM SPRINGFIELD PUMPING STATION; TAP.

(No. per c. c.) TABLE

Bacteria	2600	1395	860	3000	1700	4500	450	14200	1800	265	700	4200	Lost
Meteorological Statistics													
Rain-fall in inches week preceding	.81	.16	2.18	.46	1.07	.99	1.21	1.22	.64	.18	.62	1.50	.49
Date	Jan 16	Jan 23	Jan 23	Feb 6	Feb 20	Feb 27	Mch 20	Mch 27	Apl 3	Apl 3	Apl 10	Apl 17	Apl 24
Mean temperature week ending	29°	31°	31°	27°	34°	33°	35°	42°	42°	42°	47°	47°	46°

In addition to the genera above tabulated as being found in quantities of five or more per C. C., in any one sample, the following also occurred: ***Diatoms***—Amphora, Cymbella, Diatoma, Epithemia, Fragilaria, Gomphonema, Nitzschia, Surirella, Pleurosigma. ***Cyanophyceæ***—Chroococcus, Oscillaria, Rivularia; ***Algæ***—Closterium, Conferva, Desmidium, Hyalotheca, Pediastrum, Scenedesmus, Spirogyra, Ulothrix, Zygnema; ***Infusoria***—Dinobryon, Monas, Synura, Mallomonas; ***Vermes***—Brachionus. ***Crustacea*** Daphnia: ***Fungi***—Molds.

MICROSCOPICAL EXAMINATION OF WATER FROM SPRINGFIELD POND; OVERFLOW.

(No. per c. c.) TABLE

Number	597	623	654	696	739	782	818	856	890
Date of Collection	1897 July 21	July 28	Aug 4	Aug 11	Aug 18	Aug 25	Aug 31	Sept 15	Sept 28
Temperature	74°	65°	74°	72°		72°	73°	70°	58°
Diatomaceæ	96	482	600	91	560	1076	80	127	176
Eunotia		5	8	..	...	..	...	..	..
Melosira	73	324	444	46	20	64	24	77	25
Navicula	..	5	16	....	16		8	12	....
Nitzschia	....	..	64	22	496	1000	..	....	....
Tabellaria	..	10	12	...	....	.	16	..	....
Synedra	18	133	56	17	16	8	16	30	142
Cyanophyceæ	..	4	..	....	....	...	..	....	....
Algæ	8	14	12	14	52	16	8	3	4
Raphidium	..	..	....	....	28		....	...	...
Scenedesmus	...	...	..	9	16	8	....	....	...
Staurastrum	....	6	....	...	...	..	.	..	....
Fungi	..	....	4	...	...		....		1
Infusoria	120	83	120	225	1216	536	136	21	5
Cryptomonas	....	...	....	.	12	52		13	...
Dinobryon	...	..	12	223	444	172	100	..	....
Dinobryon Cases	..	...	..	. .	436	200	24	..	. ..
Euglena	..	20	...	...	12	..	..	.	...
Monas	118	57	100	..	284	48	8	...	....
Mallomonas	.	..	.	.	...	8	..	...	....
Trachelomonas	..	...	....		28	48	. .	....	. ..
Vermes	7	1	8	5	...	8	..	....	....
Anurea	..	.	....	.	...	8	....	..	....
Rotifer	5	.		....	..	...	..	....	....
Total Organisms	231	584	744	335	1828	1636	224	151	186
Total Genera	14	19	16	14	16	15	13	14	12

BACTERIAL EXAMINATION OF WATER FROM SPRINGFIELD POND; OVERFLOW.

(No. per c. c.) TABLE

Bacteria	500	600	5000	900	1700	1000	200	700	1200
Meteorological Statistics.									
Rain-fall in inches week preceding	2.21	2.42	2.31	1.14	.58	1.50	.80	.00	1.17
Date	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the genera tabulated above as occurring in quantiites of five or more per C. C. in any one sample; the following were also found: ***Diatoms***—Amphiprora, Amphora, Cyclotella, Gomphonema, Meridion; ***Cyanophyceæ***—Oscillaria; ***Algæ***—Closterium, Cosmarium, Eudorina, Pandorina Pediastrum, Protococcus, Staurastrum; ***Infusoria***—Paramœcium, Phacus Vorticella ***Vermes***—Polyartha, Brachionus, Triarthra; ***Fungi***—Molds; ***Sponge spicules***—Amorphous matter.

MICROSCOPICAL EXAMINATION OF WATER FROM
SPRINGFIELD POND; INLET.

(No. per c. c.) TABLE

Number	695	738	781	891
Date of Collection	1897 Aug 11	Aug 18	Aug 25	Sept 28
Temperature	68°	....	65°	56°
Diatomaceæ	3	11	35	22
Asterionella	....	....	....	5
Nitzschia	....	7	6	....
Synedra	....	....	26	14
Algæ	7	1	12	1
Cosmarium	5	....	....	....
Scenedesmus	....	....	7	....
Infusoria	1	3	6	3
Vermes	....	....	1	....
Total Organisms	11	15	54	26
Total Genera	7	7	12	7

BACTERIAL EXAMINATION OF WATER FROM
SPRINGFIELD POND; INLET. TABLE

Bacteria	2100	1700	6000	2300
Meteorological Statistics.				
Rain-fall in inches week preceding	1.14	.58	1.35	1.17
Date	Aug 14	Aug 21	Aug 28	Oct
Mean temperature week ending	73°	73°	70°	60°

CHEMICAL EXAMINATION OF WATER FROM BAISELEY'S POND; OVERFLOW. (Parts per 100,000)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
17	Dec. 22	....	......	......	....	....	....	.0070	.0114	....	.....	.0000	.2742	....	11.70	4.00	7.70	3.0	1.05	....
	1897																			
33	Jan 6	....	......	......	....	....	....	.0036	.0090	....	.....	.0000	.2440	....	.....	..	....	..	1.05	....
63	27	..	......	......	....	....	....	.0094	.0136	..	.....	.0000	.3217	....	11.60	3.90	7.70	3.7	1.00	....
86	Feb 4	....	......	......	....	....	....	.0054	.0126	....	.....	.0000	.2756	..	.....	....	....	..	1.10	....
108	9	...	......	......	....	....	....	.0102	.0118	....	.....	.0000	.2881	..	.....	....	....	..	1.03	....
131	16	..	......	......	....	....	....	.0112	.0116	....	.....	.0000	.2543	....	.....	....	....	....	0.50	....
166	25	....	......	......	....	....	....	.0118	.0166	....	.....	.0000	.3032	....	.....	....	..	....	1.00	....
185	Mch 2	. ..	......	......	....	....	....	.0060	.0142	....	....	.0000	.2751	...	12.80	6.50	6.30	3.3	0.95	....
226	10	...	......	......	....	....	....	.0046	.0126	....	.....	.0000	.1939	....	.....	....	....	...	0.95	....
244	17	..	......	......	....	....	....	.0026	.0154	....	.....	.0000	.2778	....	....	...	....	....	1.00	.. ..
274	24	..	......	......	....	....	....	.0000	.0245	....	....	.0000	.2965	....	.....	....	..	....	1.00	....
298	31	...	......	......	....	....	....	.0000	.0090	....	.. .	.0000	.2471	.	.....	....	...	.	0.90	....
332	Apl 7	....	......	......	....	....	....	.0000	.0380	...	....	.0000	.1976	...	12.00	5.30	6.70	3.7	1.00	....
361	14		......	......	....	....	....	.0000	.0104	....	.....	.0000	.2800	...	....	....	....	....	1.00	....
392	23	..	......	......	....	....	....	.0000	.0355	....	.....	.0000	.1812	....	....	....	....	....	1.00	....
410	30	.	marked	fltg m't†	....	....	marshy........	0000	.0360	....	.....	.0000	.1812	....	....	....	....	...	0.85	....
440	May 6	64°	md turb	none...	md straw	....	marshy	.0004	.0466	. .	.....	.0000	.1479	. .	12.70	3.60	9.10	6.4	1.05	....
469	14	61°	md turb	none...	md. straw	....	md. veg........	.0006	0489	....	....	.0000	.1313	..	....	....	....	....	1.09	....
507	20	63°	md turb	none...	md. straw	....	md. veg.	.0000	.0525	....	.....	.0000	.1153	..	....	....	....	...	1.00	....
551	27	63°	md turb	none...	md. straw	....	md. veg........	.0006	.0524	....	.....	.0000	.1313	....	....	...	....	....	0.95	....
589	June 4	64°	md tnrb	none...	md. straw	....	veg........	.0006	.0564	...	.. .	.0000	.1148	...	12.50	5.10	7.40	4.2	1.00	....
619	9	61°	md turb	min veg	md. straw	....	sl. veg........	.0008	.1012	. .	...	.0000	.0982	...	....	....	..	...	1.00	....
667	16	70°	md turb	min veg	md. straw	....	sl. marshy........	.0004	.1116	....	...	.0000	.1149	....	....	..	....	....	0.90	....
699	July 15	76°	decid ..	g'n s'm*	....	dist. veg. & grassy....	faintly veg. & aromatic	.0024	.0666	...	.....	.0000	.....	....	....	....	...	....	0 93	....
724	21	74°	decid .	cons ...	0.50	dist. veg. & grassy....	dist. veg. & grassv. ..	.0018	.0616	.....	.....	.0001	.0270	....	.....	..	...	4.2	0.95	... .
750	29	68°	decid ..	g'n s'm*	0.80	dist. veg & grassy....	decid. veg. & grassy ..	.0018	.1054	... .	.....	.0005	.0070	0.56	12.30	3.30	9.00	6.7	0.93	....
779	Aug 4	74°	dist ..	g'n s'm*	0.60	dist. veg..	decid. veg. & grassy..	.0012	.0790	.0254	.0536	.0006	.0120	0.48	12.00	2.70	9 30	4.2	1.91	....
836	12	75°	decid ..	g'n s'm*	0.35	dist veg. & grassy ...	decid. veg. & grassy	.0008	.1064	0278	.0786	.0000	.0030	0 44	10.40	2.20	8.20	4.4	1 03	....
886	19	....	d cid ..	g'n s'm*	0.24	dist. veg. & grassy.. .	dist. veg & grassy. .	.0036	.0904	.0208	.0696	.0000	.0000	0.27	11.00	2.40	8.60	3.6	1.00	.. ..
929	26	72°	decid .	g'n s'm*	0.25	dist. veg & grassy....	decid. veg. & grassy..	.0092	.1112	.0420	.0692	.0000	.0000	0.34	10.90	2.30	8 60	4.2	1.05	....
949	31	74°	decid ..	g'n s'm*	0.17	dist. veg. & grassy ...	decid. veg. & grassy .	.0076	.0840	.0200	0640	.0000	.0030	0.16	10.00	2.00	8.00	4.4	1.08	..
1002	Sept 16	70°	decid ..	g'n s'm*	0.33	dist. veg. & aromatic..	decid veg & grassy..	.0048	.0740	.0240	0500	.0007	.0170	0.26	11.00	2.30	8.70	4.6	1.08	.0070
1019	28	56°	decid ..	g'n s'm*	0.37	faintly veg. & grassy	dist. veg. & grassy....	.0012	.1168	.0252	.0916	.0001	.0120	0.35	11.00	2.10	8.90	4.0	1.08	0500

NOTE.—Samples numbered 17, 33, 131 and 226 were collected at the gate house. *green scum. †floating matter.

CHEMICAL EXAMINATION OF WATER FROM BAISELEY'S POND ; INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
508	May 20	..	sl. turb.	con veg	sl. straw..	....	med. veg....... ..	.0014	.0096	.....	.....	.0000	.2129	...	.....	...	..	..	1.00	....
552	27	56°	sl. turb.	sl. veg.	normal ..	....	sl. marshy.....	.0022	.0123	....	...	.0000	.3605	....	...	....	....	. .	.98	....
620	June 9	54°	md ...	con veg	sl. straw.	....	sl. veg.	.0068	.0562	... .	....	.0000	.1097	.	... .	...	....	..	1.00	....
668	16	58°	clear...	con veg	normal...	....	sl. marshy..........	.0032	.0183	.....	...	.0004	.2440	...	....	....	....	..	1.05	....
835	Aug. 12	64°	v. slight	cons...	0.15	faintly veg.....	decid veg....	.0022	.0070	.0070	.0000	.0001	.1200	0.13	11.00	2.90	8.10	4.3	1.01	....
887	19	....	slight.	cons...	0.24	v. faintly veg	faintly veg & unpl'sant	.0038	.0078	.0074	.0004	.0002	.2500	0.10	... .	...	...	4.0	1.02	. ...
930	26	62°	decid ..	cons...	0.40	faintly veg....... ..	faintly veg.	.0058	.0180	.0122	.0058	.0004	.2000	0.19	12.00	3.70	8.30	4.4	.93	. ...
1018	Sept. 28	49°	v. slight	cons. threads	0.15	faintly veg...	faintly veg....	.0034	.0050	.0048	.0002	.0001	.2400	0.11	10.90	2.90	8.00	4.4	.93	.0120

MICROSCOPICAL EXAMINATION OF WATER FROM BAISELEY'S POND; OVERFLOW. (No. per c. c.) TABLE

Number	17	55	61	85	104	122	141	168	195	224	253	283	316	356	403	443	473	521	552	571	596	622	651	715	758	801	816	870	887
Date of Collection	1897 Jan 11	Feb 4	Feb 9	Mch 2	Mch 17	Mch 24	Mch 31	Apl 7	Apl 14	Apl 23	Apl 30	May 6	May 14	May 20	May 27	J'ne 4	J'ne 9	J'ne 16	July 8	July 15	July 21	July 28	Aug 4	Aug 12	Aug 19	Aug 26	Aug 31	Sept 16	Sept 28
Temperature	...	...	...	...	...	...	...	...	53°	54°	60°	64°	61°	63°	63°	64°	61°	70°	80°	76°	74°	68°	74°	75°	...	72°	74°	70°	60°
Diatomaceæ	...	14	18	482	309	31	1300	845	1064	809	2288	2724	4276	2984	4812	1119	4220	...	348	242	140	1000	185	...	380	100	100	860	1900
Asterionella	...	6	6	26	26	6	148	13	...	5	96	16	...	16	24	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Eunotia	...	...	...	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cyclotella	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...	20
Fragilaria	...	...	...	30	...	13		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Melosira	...	...	...	42	...	...	600	695	811	503	1900	2152	3800	2400	4000	776	1000	...	204	183	72	600	80	...	360	100	...	740	1320
Meridion	...	...	...	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Navicula	...	...	...	28	...	...	...	...	...	...	...	44	28	...	68		...	...	...	...	...	...	10	...	...	...	100	...	...
Nitzschia	...	8	6	42	23	...	100	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Synedra	...	...	6	280	247	6	448	134	247	298	288	508	436	552	720	339	3200	...	140	57	68	400	90	...	...	...	...	120	560
Tabellaria	...	...	...	18	5	...	...	...	...		...		...	12	...	...	20	...	...	...	...	...	...	...	20	...	...	...	...
Cyanophyceæ	...	...	...	...	...	...	72	...	...	738	924	1488	1056	808	884	1050	3200	2720	508	653	1980	3460	4180	670	2260	15800	6400	1820	1380
Anabaena	...	...		...	...	...	...	...	...	...	...	20	...	...	36	...	...	...	...	...	...	60	55	20	460	200	100	...	...
Clathrocystis	...	...	...	...	...	...	20	...	...	66	120	68	...	248	504	1050	3200	2720	468	653	772	1400	590	650	600	600	300	1000	1380
Microcystis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...	...
Oscillaria	...	...	...	...	...	...	52	...	...	670	800	1400	1056	560	344	...	...	...	40	...	1208	2000	3530	...	1200	15000	6000	820	...
Algæ	...	...	...	116	77	7	68	23	10	27	120	224	152	56	80	44	80	20	88	19	36	60	75	10	60	30	100	80	40
Arthrodesmus	...	...	...	...	...	...	...	...	...	...	...	...	8	...	8		...	...	...	...	...	...	...	...	...	...	...	...	...
Closterium	...	...	...	...	...	...	28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Conferva	...	...	...	50	68	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cosmarium	...	...	...	6	...	...	...	...	...	...	28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Pandorina	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	20	...	...	...	...	...	...	...
Pediastrum	...	...	...	6	...	...	...	...	...	...	...	20	8	8	16	13	20	20	8	5	...	...	5	10	20	10	...	20	...
Protococcus	...	...	...	14	...	...	8	...	...	5	...	24	120	...	40	8	...	...	...	...	...	...	...	...	...	...	...	...	...
Raphidium	...	...	...		...	...	...	11	...	- 12	52	96	...	...		...	...	...	...	...	...	...	...	...	...	...	...	...	...
Scenedesmus	...	...	...	26	...	...	20	7	...	5	12	52	12	28	...	11	40	...	64	10	28	20	70	...	20	20	100	60	40
Staurastrum	...	...	...	14	...	...	...	...	...	...	28	32	...	16	16	11	20	...	16	...	...	20	...	...	20	...	...	...	...
Ulothrix	...	...	...	...	...	...	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Continued on next page.

MICROSCOPICAL EXAMINATION OF WATER FROM BAISELEY'S POND; OVERFLOW.—Continued

Fungi	....	....	....	6	1	....	....	....	....	1	...	4	...	....	4	2	...	....	...	...	...	....	5	....	...	....	....	..	...
Crenothrix	....	....	...	6	...	....	...	...	....	...	...	....	...	...	...	....	....	...	...	...	...	....	....	..	...	....	....	....	...
Infusoria	....	32	44	108	22	....	8	5	1	5	16	8	....	....	20	....	...	...	...	....	....	20	5	...	....	200	...	20	20
Cryptomonas	..	....	....	....	....	....	...	....	....	...	...	..	....	..	...	....	....	...	..	....	....	...	....	....	...	100	....	....	20
Dinobryon	....	32	44	108	....	....	8	....	....	..	..	..	...	...	...	...	...	...	..	....	....	...	....	....	..	..	..	...	....
Dinobyron Cases	...	....	....	....	....	....	..	5	....	....	...	...	....	....	....	....	....	....	...	....	....	....	....	....	....	....	....	....	....
Euglena	..	....	...	...	....	...	..	..	...	....	...	...	...	...	20	....	..	...	...	....	....	....	...	....	...	....	....	....	....
Monas	....	..	....	....	....	....	....	..	....	5	....	....	....	....	...	....	...	..	..	....	....	...	5	....	...	100	...	...	...
Peridinium	....	....	....	....	....	..	....	...	....	....	16	..	...	...	....	...	....	....	....	..	..	20	....	....	....	....	....	....	....
Vorticella	...	....	...	..	....	....	....	....	....	....	..	.	..	....	.	..	....	....	...	....	....	...	...	....	....	....	....	20	.
Mallomonas	....	....	...	...	17	....	....	...	....	....	....	...	...	..	..	...	....	...	....	.	....	..	..	....	...	....	....	....	..
Vermes	...	..	....	...	...	.	...	2	....	....	....	...	..	....	4	6	....	...	...	1	..	....	....	..	....	....	....	....	40
Rotifer	....	....	...	....	....	....	....	...	..	.	.	....	..	....	....	6	...	....	...	...	.	..	.	....	....	....	...	....	40
Total Organisms	.	46	62	712	409	38	1430	875	1095	1580	3348	4448	5484	3848	5804	222	7500	2740	944	915	2156	4520	4450	2700	2640	16130	6600	2780	3380
Total Genera	8	3	4	17	15	8	13	11	11	16	12	16	12	11	14	13	7	2	8	9	7	8	12	8	8	8	5	7	7

BACTERIAL EXAMINATION OF WATER FROM BAISELEY'S POND; OVERFLOW. (No. per c. c) TABLE

Bacteria	1800	1600	3600	1500	2600	2200	1400	600	1400	400	500	5200	3200	220	1200	1400	4000	45	....	....	400	1100	100	95	140	100	700	1300	600
Meteorological Statistics.																													
Rain-fall in inches week preceding	.81	.46	1.10	.06	1.21	1.22	.18	.62	1.50	.49	.08	1.40	2.94	.87	.95	1.74	1.18	.99	.75	4.37	2.21	2.42	2.31	.39	.58	2.15	.80	.00	1.17
Date	Jan 16	Feb 6	Feb 13	Mch 6	Mch 20	Mch 27	Apl 3	Apl 10	Apl 17	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 10	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	29°	27°	33°	35°	35°	42°	42°	47°	47°	46°	53°	54°	60°	60°	60°	62°	61°	68°	78°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

In addition to the genera above tabulated as being found in quantities of five or more per C. C. in any sample, the following also occurred: ***Diatoms***—Achnanthes, Amphiprora, Cymbella, Gomphonema; ***Algæ***—Protococcus, Spirogyra; ***Infusoria***—Uroglena; ***Vermes***—Polyartha.

MICROSCOPICAL EXAMINATION OF WATER FROM BAISELEY'S POND; INLET.

(No. per c.c.) TABLE

Number	357	404	474	522	716	759	802	886
Date of Collection	1897 May 20	May 27	J'ne 9	J'ne 16	Aug 12	Aug 19	Aug 26	Sept 28
Temperature	55°	56°	54°	58°	64°	....	62°	49°
Diatomaceæ	4	71	64	38	1	2	7	3
Melosira	...	49	37	14	....	..	.	..
Navicula	..	7	13	15	....	.	...	...
Synedra	....	15	9	...	..		...	....
Cyanophyceæ	....	1	1	....	2	...	2	....
Algæ	...	..	1	. ..	...	....	...	...
Fungi	.	1	....	4	...	...	...	...
Infusoria	....	...	....	....	..	...	12	....
Trachelomonas	..	...	....	....	...	...	12	..
Total Organisms	4	73	66	42	3	2	21	4
Total Genera	3	5	8	6	2	1	5	3

BACTERIAL EXAMINATION OF WATER FROM BAISELEY'S POND; INLET.

(No. per c.c.) TABLE

Bacteria	2000	470	35000	3000	3900	2700	6200	2400
Meteorological Statistics								
Rain-fall in inches week preceding	.87	.95	1.18	.99	.39	.58	1.50	1.17
Date	May 22	May 29	J'ne 12	J'ne 19	Aug 14	Aug 21	Aug 28	Oct 2
Mean temperature week ending	60°	60°	61°	68°	73°	73°	70°	60°

CHEMICAL EXAMINATION OF WATER FROM RIDGEWOOD PUMPING STATION, NEW PLANT; TAP. (Parts per 100,000.)

No.	Date of Collection		Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																				
369	Apl	19	....	....	....	....	....	....	.0023	.0053	....	....	.0000	.1299	....	....	...	..	....	1.40	...
422	May	3	57°	....	slight	sl. straw	....	marshy	.0020	.0038	....	....	.0000	.2289	....	10.00	5.20	4.80	....	1.55	....
456		10	59°	slight	sl. veg.	sl. straw	....	sl. marshy	.0020	.0052	....	....	.0000	.1466	....	....	....	....	....	1.15	....
481		17	61°	slight	none	sl. straw	....	sl. marshy	.0021	.0065	....	....	.0000	.1383	....	....	....	..	....	1.55	....
525		24	64°	slight	none	sl. straw	....	sl. marshy	.0022	.0053	....	....	.0000	.1052	..	....	...	...	....	1.60	....
569	June	1	63°	slight	none	normal	....	none	.0018	.0082	....	....	.0000	.1138	....	10.10	3.40	6.70	....	1.70	....
605		7	62°	slight	none	sl. straw	....	sl. marshy	.0030	.0130	....	....	.0000	.1128	..	....	....	...	...	1.50	....
685		17	65°	clear	sl. veg.	normal	....	md. marshy	.0026	.0184	....	....	.0000	.1296	..	....	....	...	...	1.60	....
698	July	14	72°	slight	slight	....	faintly veg.	dist. veg.	....	....	....	....	....	....	....	....	....	....	...	....	....
737		23	70°	v. slight	cons.	0.37	dist. veg.	dist. veg.	.0022	.0132	....	....	.0000	.0600	....	...	....	...	3.1	1.54	....
765		29	64°	v. slight	cons.	0.42	dist. veg.	dist. veg.	.0032	.0116	.	...	.0000	.0750	0.48	10.70	3.90	6.80	2.9	1.73	....
798	Aug	5	68°	v. slight	slight	0.32	faintly veg.	faintly veg.	.0042	.0084	.0074	.0010	.0000	.0550	0.29	10.60	2.70	7.90	3.1	1.86	....
844		11	67°	v. slight	slight	0.15	v. faintly veg.	faintly veg.	.0042	.0112	.0112	.0000	.0000	.0650	0.22	9.20	3.00	6.20	3.1	1.53	....
885		19	....	v. slight	slight	0.25	faintly veg.	faintly veg.	.0012	.0084	.0076	.0008	.0000	.0430	0.22	8.80	2.50	6.30	2.7	1.43	....
928		26	68°	v. slight	slight	0.19	v. faintly veg.	faintly veg.	.0030	.0108	.0092	.0016	.0000	.0550	0.20	10.40	2.80	7.60	3.9	2.01	....
967	Sept	1	69°	v. slight	slight	0.18	faintly veg	faintly veg.	.0028	.0082	.0066	.0016	.0001	.0650	0.20	10.00	3.00	7.00	3.1	1.79	....
1001		16	66°	v. slight	slight	0.06	faintly veg	v. faintly veg	.0030	.0068	.0068	.0000	.0001	.0450	0.07	10.00	3.00	7.00	3.8	1.80	.0050
1012		27	55°	v slight	slight.	0.07	v. faintly veg.	v. faintly veg.	.0030	.0068	.0054	.0014	.0001	.0600	0.09	10.30	2.80	7.50	3.1	1.84	.0070

CHEMICAL EXAMINATION OF WATER FROM RIDGEWOOD PUMPING STATION, OLD PLANT; TAP. (Parts per 100.000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid Total	Ammonia: Albuminoid In Solution	Ammonia: Albuminoid In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																			
368	Apl 19							.0043	.0075			.0000	.1611		11.50	4.00	7.50		1.65	
421	May 3	59°	slight	sl. veg.	sl. straw		marshy	.0041	.0059			.0000	.2437		12.90	5.50	7.40	3.4	1.90	
455	10	64°	slight	sl. veg.	sl. straw		sl. marshy	.0033	.0091			.0000	.1784						1.65	
480	17	61°	slight	none	sl. straw		sl. marshy	.0045	.0067			.0000	.1775						1.95	
524	24	65°	slight	sl. veg.	sl. straw		sl. marshy	.0030	.007			.0000	.1787						2.05	
568	June 1	63°	slight	none	normal		none	.0036	.0094			.0000	.1699		11.80	3.80	8.00	3.4	2.05	
604	7	62°	slight	none	sl. straw		sl. marshy	.0041	.0084			.0000	.1366						1.90	
684	17	67°	clear	none	normal		md. marshy	.0049	.0206			.0000	.1442						1.75	
697	July 14	73°	slight	slight		aromatic & faint. veg.	dist. veg													
736	23	78°	v. slight	slight	0.30	faintly veg	dist. veg	.0026	.0114			.0000	.0750					5.9	2.38	
764	29	65°	v. slight	cons.	0.30	dist. veg	dist. veg	.0038	.0110			.0000	.0630	0.36	13.80	4.50	9.30	5.6	2.55	
797	Aug 5	68°	v. slight	cons.	0.20	faintly veg.	dist. veg	.0044	.0098	.0082	.0016	.0001	.0400	0.22	13.70	3.20	10.50	4.4	2.40	
843	12	69°	v. slight	slight	0.12	v. faintly veg.	faintly veg.	.0050	.0102	.0102	.0000	.0000	.0430	0.16	12.80	4.00	8.80	4.0	2.16	
884	19	..	v. slight	v. slight	0.17	faintly veg.	faintly veg	.0044	.0076	.0070	.0006	.0001	.0550	0.14	13.30	3.60	9.70	4.9	2.67	
927	26	69°	v. slight	slight	0.15	v. faintly veg.	faintly veg.	.0054	.0104	.0094	.0010	.0001	.0670	0.14	14.00	4.10	9.90	4.9	2.60	
966	Sept 1	70°	v. slight	cons.	0.16	v faintly veg	v. faintly veg.	.0044	.0062	.0056	.0006	.0001	.0470	0.17	14.00	2.70	11.30	5.4	2.80	
1011	27	62°	v. slight	slight	0.07	v. faintly veg	v. faintly veg.	.0042	.0078	.0066	.0012	.0001	.0550	0.09	11.80	3.20	8.60	4.3	2.57	.0120

CHEMICAL EXAMINATION OF WATER FROM RIDGEWOOD PUMPING STATION, NEW PLANT; TAP. (Parts per 100,000.)

No.	Date of Collection	Tem.	APPEARANCE			ODOR		AMMONIA				NITROGEN AS		Oxygen Consumed	RESIDUE ON EVAPORATION			Hardness	Chlorine	Iron
			Turbidity	Sediment	Color	Cold	Hot	Free	ALBUMINOID Total	In Solution	In Suspension	Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
	1897																			
369	Apl 19	....	....	....	....	....	....	.0023	.0053	....	....	.0000	.1299	....	....	...	..	...	1.40	.
422	May 3	57°	....	slight..	sl. straw.	....	marshy	.0020	.0038	....	....	.0000	.2289	....	10.00	5.20	4.80	....	1.55	...
456	10	59°	slight..	sl. veg.	sl. straw.	....	sl. marshy	.0020	.0052	...	....	.0000	.1466	....	....	....	....	....	1.15	....
481	17	61°	slight..	none..	sl. straw.	....	sl. marshy	.0021	.0065	....	...	.0000	.1383	....	..	..	..	...	1.55	....
525	24	64°	slight..	none..	sl. straw.	....	sl. marshy	.0022	.0053	..	....	.0000	.1052	..	....	...	...	....	1.60	....
569	June 1	63°	slight..	none..	normal...	....	none	.0018	.0082	....	....	.0000	.1138	....	10.10	3.40	6.70	....	1.70	....
605	7	62°	slight..	none.	sl. straw.	....	sl. marshy	.0030	.0130	..	....	.0000	.1128	..	....	....	...	...	1.50	....
685	17	65°	clear..	sl. veg.	normal...	....	md. marshy	.0026	.0184	....	....	.0000	.1296	..	....	....	...	...	1.60	....
698	July 14	72°	slight..	slight..	......	faintly veg.	dist. veg.	....	....	....	....	....	...	...	....	....	....	...	...	....
737	23	70°	v. slight	cons..	0.37	dist. veg.	dist. veg.	.0022	.0132	...	....	.0000	.0600	....	...	....	...	3.1	1.54	....
765	29	64°	v. slight	cons..	0.42	dist. veg.	dist. veg.	.0032	.0116	.	...	.0000	.0750	0.48	10.70	3.90	6.80	2.9	1.73	....
798	Aug 5	68°	v. slight	slight..	0.32	faintly veg.	faintly veg.	.0042	.0084	.0074	.0010	.0000	.0550	0.29	10.60	2.70	7.90	3.1	1.86	....
844	11	67°	v. slight	slight..	0.15	v. faintly veg.	faintly veg.	.0042	.0112	.0112	.0000	.0000	.0650	0.22	9.20	3.00	6.20	3.1	1.53	....
885	19	....	v. slight	slight..	0.25	faintly veg.	faintly veg.	.0012	.0084	.0076	.0008	.0000	.0430	0.22	8.80	2.50	6.30	2.7	1.43	....
928	26	68°	v. slight	slight..	0.19	v. faintly veg.	faintly veg.	.0030	.0108	.0092	.0016	.0000	.0550	0.20	10.40	2.80	7.60	3.9	2.01	....
967	Sept 1	69°	v. slight	slight..	0.18	faintly veg	faintly veg.	.0028	.0082	.0066	.0016	.0001	.0650	0.20	10.00	3.00	7.00	3.1	1.79	....
1001	16	66°	v. slight	slight..	0.06	faintly veg	v. faintly veg	.0030	.0068	.0068	.0000	.0001	.0450	0.07	10.00	3.00	7.00	3.8	1.80	.0050
1012	27	55°	v slight	slight.	0.07	v. faintly veg.	v. faintly veg.	.0030	.0068	.0054	.0014	.0001	.0600	0.09	10.30	2.80	7.50	3.1	1.84	.0070

CHEMICAL EXAMINATION OF WATER FROM RIDGEWOOD PUMPING STATION, OLD PLANT; TAP. (Parts per 100.000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																			
368	Apl 19	...	...	...	...	...	...	.0043	.0075	...	...	.0000	.1611	...	11.50	4.00	7.50	...	1.65	...
421	May 3	59°	slight	sl. veg.	sl. straw	...	marshy	.0041	.0059	...	...	.0000	.2437	...	12.90	5.50	7.40	3.4	1.90	...
455	10	64°	slight	sl. veg.	sl. straw	...	sl. marshy	.0033	.0091	...	...	.0000	.1784	...	...	...	...	...	1.65	...
480	17	61°	slight	none	sl. straw	...	sl. marshy	.0045	.0067	...	...	.0000	.1775	...	...	...	...	...	1.95	...
524	24	65°	slight	sl. veg.	sl. straw	...	sl. marshy	.0030	.007	...	...	.0000	.1787	...	...	...	...	...	2.05	...
568	June 1	63°	slight	none	normal	...	none	.0036	.0094	...	...	.0000	.1699	...	11.80	3.80	8.00	3.4	2.05	...
604	7	62°	slight	none	sl. straw	...	sl. marshy	.0041	.0084	...	...	.0000	.1366	...	...	...	...	...	1.90	...
684	17	67°	clear	none	normal	...	md. marshy	.0049	.0206	...	...	.0000	.1442	...	...	...	...		1.75	...
697	July 14	73°	slight	slight	...	aromatic & faint. veg.	dist. veg	...	...	...	...	...	...	...	...	...	...	...	...	...
736	23	78°	v. slight	slight	0.30	faintly veg.	dist. veg	.0026	.0114	...	...	.0000	.0750	...	...	...	...	5.9	2.38	...
764	29	65°	v. slight	cons.	0.30	dist. veg	dist. veg	.0038	.0110	...		.0000	.0630	0.36	13.80	4.50	9.30	5.6	2.55	...
797	Aug 5	68°	v. slight	cons.	0.20	faintly veg.	dist. veg	.0044	.0098	.0082	.0016	.0001	.0400	0.22	13.70	3.20	10.50	4.4	2.40	...
843	12	69°	v. slight	slight	0.12	v. faintly veg.	faintly veg.	.0050	.0102	.0102	.0000	.0000	.0430	0.16	12.80	4.00	8.80	4.0	2.16	...
884	19	...	v. slight	v. slight	0.17	faintly veg.	faintly veg	.0044	.0076	.0070	.0006	.0001	.0550	0.14	13.30	3.60	9.70	4.9	2.67	...
927	26	69°	v. slight	slight	0.15	v. faintly veg.	faintly veg.	.0054	.0104	.0094	.0010	.0001	.0670	0.14	14.00	4.10	9.90	4.9	2.60	...
966	Sept 1	70°	v. slight	cons.	0.16	v. faintly veg	v. faintly veg.	.0044	.0062	.0056	.0006	.0001	.0470	0.17	14.00	2.70	11.30	5.4	2.80	...
1011	27	62°	v. slight	slight	0.07	v. faintly veg	v. faintly veg.	.0042	.0078	.0066	.0012	.0001	.0550	0.09	11.80	3.20	8.60	4.3	2.57	.0120

MICROSCOPICAL EXAMINATION OF WATER FROM RIDGEWOOD PUMPING STATION, NEW PLANT; TAP.

(No. per c. c.)

TABLE

Number	239	265	300	328	376	423	459	539	570	609	637	670	714	757	800	835	869	880
Date of Collection	1897 April 26	May 3	May 10	May 17	May 24	June 1	June 7	June 17	July 14	July 23	July 29	Aug 5	Aug 12	Aug 19	Aug 26	Sept 1	Sept 16	Sept 27
Temperature	57°	57°	59°	60°	64°	63°	62°	65°	72°	72°	64°	67°	67°	....	68°	69°	66°	62°
Diatomaceæ	7	10	76	22	30	25	29	4	28		2	28	18	10	103	2	85	81
Asterionella	..	...	...	...	..	...	21	..	..		....	....	..	...	...	....	...	....
Melosira	....	10	57	16	26	20	....	....	19		....	22	17	6	100	.	83	72
Synedra	..	....	16	....	....	...	...	..	....		...	..	....	.	....	..	...	..
Cyanophyceæ	1	...	1	....	...	7	6	28	....		1	1	5	2	1	1	1	4
Clathrocystis	....	...	..	..	..	...	5	28	....		....	...	....	....	..	....	....	....
Algæ	....	1	...	...	1	1	....	....	4	Lost	....	1	1	...	1	....	1	...
Fungi	..	...	....	..	....	....	...	....	5		...	....	..	...	....	...	....	....
Infusoria	3	...	6	4	....	2	6	2	1		3	4	1	2	2	1	5	1
Dinobryon		...	....	....	....	....	....	....	....		...	....	...	....	....	....	5	..
Vermes	....	....	...	...	...	...	...	...	...		....	..	....	...	..	....	1	....
Total Organisms	11	11	83	26	31	35	41	34	38		6	34	25	14	107	4	93	86
Total Genera	6	2	8	8	3	7	8	4	10		3	8	8	5	7	4	6	8

BACTERIAL EXAMINATION OF WATER FROM RIDGEWOOD PUMPING STATION, NEW PLANT; TAP.

(No. per c. c.)

TABLE

Bacteria	...	2000	500	240	180	200	200	300	...	300	1200	400	400	2800	1100	400	900	800
Meteorological Statistics.																		
Rain-fall in inches for week preceding	.02	1.39	.07	3.01	.38	1.54	.70	.01	3.67	2.21	3.85	1.03	.39	.58	2.15	.00	.00	1.20
Date	May 1	May 8	Ma 15	May 22	May 29	June 5	June 12	June 19	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature for week ending	53°	54°	60°	60°	60°	62°	61°	68°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

MICROSCOPICAL EXAMINATION OF WATER FROM RIDGEWOOD PUMPING STATION OLD PLANT; TAP.

(No. per c. c.)

TABLE

Number	201	238	264	299	327	375	422	458	538	569	608	636	669	713	756	799	834	879
Date of Collection	1897 Apl 19	Apl 26	May 3	May 10	May 17	May 24	J'ne 1	J'ne 7	J'ne 17	July 14	July 23	July 29	Aug 5	Aug 12	Aug 19	Aug 26	Sept 1	Sept 27
Temperature	..	62°	59°	64°	61°	65°	63°	62°	67°	73°	71°	65°	67°	69°	...	69°	70°	61°
Diatomaceæ	20	20	13	66	86	86	24	14	16	43	64	50	18	9	7	113	10	165
Asterionella	...	..	...	....	....	....	....	6	..	....	...	....	....	....	....	....	...	7
Melosira	13	13	10	17	78	75	11	6	7	33	63	47	15	7	....	113	6	152
Synedra	....	...	....	48	6	10	6	....	5	...	....	....	....	....	...	....	....	..
Cyanophyceæ	1	....	1	....	...	5	1	10	63	2	9	21	6	3	6	4	4	3
Clathrocystis	....	...	...	....	....	....	....	10	63	....	9	19	....	..	6	....	....	..
Algæ	2	...	...	1	...	1	2	1	1	3	....	1	....	3	...	6	2	....
Dictyosphærium	....	...	....	....	....	....	....	...	....	....	....	....	....	..	...	6	....	..
Fungi	....	....	....	....	....	....	....	....	...	....	....	3	....	....	2	...	4	....
Infusoria	2	3	1	5	....	7	8	5	..	2	13	2	2	1	3	4	7	3
Dinobryon	...	....	....	....	....	....	....	5	...	....	13	....	....	...	....	....	....	...
Dinobryon Cases	....	....	..	5	...	5	7	....	....	....	....	....	...	....	....	....	...	....
Vermes	.	...	....	....	....	....	...	....	....	..	....	....	1	....	....	....	...	..
Total Organisms	25	23	15	72	86	99	35	30	80	49	86	77	27	16	18	127	27	171
Total Genera	8	6	5	5	4	8	10	7	7	11	4	11	9	6	8	6	8	7

BACTERIAL EXAMINATION OF WATER FROM RIDGEWOOD PUMPING STATION, OLD PLANT; TAP.

TABLE

Bacteria	170	...	2000	105	160	240	235	30	75	....	140	1200	3200	70	400	600	700	10000
Meteorological Statistics.																		
Rain-fall in inches for week preceding	1.00	.02	1.39	.07	3 01	.38	1.54	.70	.01	3.67	2.21	3.85	1.03	.39	.58	2.15	.00	1.20
Date	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Oct 2
Mean temperature for week ending	46°	53°	54°	60°	60°	60°	62°	61°	68°	75°	74°	70°	73°	73°	73°	70°	69°	60°

CHEMICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN NO. 1 (EASTERN); OUTLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																			
372	Apl 19	...	....	......	....	....	....	.0000	.0136	....	....	.0000	.1480	...	....	....	...	...	1.75	....
415	May 3	57°	sl. turb.	sl. veg.	sl. straw.	....	sl. marshy..........	.0000	.0150	....	.....	.0000	.2059	...	11.40	5.10	6.30	..	1.85	.....
449	10	61°	sl. turb.	sl. veg.	sl. straw.	....	sl. marshy..........	.0000	.0124	....	....	.0000	.1647	....	..	...	...	....	1.90	....
474	17	62°	sl. turb.	sl. veg.	sl. straw.	....	sl. marshy....... ..	.0000	.0060	.	....	.0000	.1482	..	...	....	...	....	1.95	...
518	24	62°	sl. turb.	m. veg.	sl. straw.	....	sl. marshy..........	.0002	.0153	....	.....	.0000	.1728	....	.....	....	...	....	1.60	.....
562	J'ne 1	61°	sl. turb.	none...	normal ..	....	med. veg..........	.0000	.0100	....	.....	.0000	.1400	....	13.30	5.80	7.50	..	2.10	...
598	7	62°	sl. turb.	none...	sl. straw.	....	sl. marshy	.0013	.0112	....	.....	.0000	.1224	....	..	....	..	....	1.95	..
678	17	65°	clear...	none...	normal...	....	med. veg......	.0005	.0100	..	....	.0000	.1478	...	...	....	....	....	2.10	...
691	July 14	72°	v. slight	v. slight	....	faintly veg	dist. veg	.....	...	....	....	...	.....	....	....	...	...	...	....	.....
730	23	72°	v. slight	v. slight	0.20	faintly veg	dist. veg...........	.0080	.0194	....	....	.0003	.0500	...	....	...	...	3.9	2.16	...
758	29	67°	v. slight	slight..	0.25	faintly veg	dist. veg	.0034	.0094	....	.....	.0000	.0800	0.30	12.60	3.80	8.80	4.4	2.35	..
791	Aug 5	70°	v. slight	slight..	0.27	faintly veg & unpleas't	dist. veg...........	.0006	.0146	.0100	.0046	.0001	.0830	0.28	13.00	4.30	8.70	4.4	2.40	....
837	12	70°	v. slight	slight..	0.20	v. faintly veg..	faintly veg	.0002	.0136	.0102	.0034	.0001	.0650	0.18	11.70	3.00	8.70	4.2	2.13	.
878	19	....	v. slight	v. slight	0.17	dist. veg	faintly veg	.0024	.0100	.0076	.0024	.0002	.0570	0.14	13.20	3.70	9.50	4.3	2.40	...
921	26	69°	v. slight	cons...	0.14	v. faintly veg.... ...	faintly veg	.0020	.0212	.0100	.0112	.0003	.0530	0.15	12.60	3.60	9.00	4.6	2.45	.....
960	Sept 1	69°	v. slight	cons...	0.14	v. faintly veg.......	v. faintly veg	.0006	.0128	.0076	.0052	.0005	.0450	0.14	12.50	2.00	10.50	5.0	2.66	..
995	16	66°	v. slight	cons...	0.05	faintly veg	faintly veg	.0012	.0196	.0088	.0108	.0002	.0450	0.09	12.30	3.10	9.20	4.7	2.55	.0070
1005	27	60°	v. slight	cons...	0.07	faintly veg & aromatic	faintly veg...... ...	.0012	.0136	.0060	.0076	.0005	.0650	0.16	11.70	2.70	9.00	4.2	2.49	.0050

CHEMICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASINS Nos. 1 AND 2 (EASTERN AND CENTRAL); INLET CHAMBER.

(Parts per 100,000.)

No.	Date of Collection	Tem.	APPEARANCE			ODOR		AMMONIA				NITROGEN AS		Oxygen Consumed	RESIDUE ON EVAPORATION			Hardness	Chlorine	Iron
			Turbidity	Sediment	Color	Cold	Hot	Free	Albuminoid Total	Albuminoid In Solution	Albuminoid In Suspension	Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
	1897																			
18	May 3	58°	sl. turb.	sl. veg.	sl. straw	......	sl. marshy......	.0034	.0056	....	....	.0000	.2442	...	11.50	4.40	7.10	3.0	2.20	...
52	10	60°	sl. turb.	sl. veg.	sl. straw	......	sl. marshy	.0030	.0058	...	....	.0000	.1458	....	...	...	..	....	1.75	....
77	17	61°	sl. turb.	sl. veg.	sl. straw	......	sl. marshy......	.0032	.0030	.	...	.0000	.2197	....	....	...	....	...	2.05	....
521	24	61°	sl. turb.	sl. veg.	sl. straw	......	sl. marshy......	.0035	.0040	...	...	.0000	.1482	..	...	....	....	....	2.15	....
565	June 1	62°	sl. turb.	sl. veg.	normal...	......	none	.0031	.0049	...	....	.0000	.1786	....	12.50	4.40	8.10	....	2.10	....
601	7	64°	sl. turb.	none ..	sl. straw	......	sl. marshy.	.0033	.0022	....	..	.0000	.1784	...	....	....	....	...	2.05	..
681	17	65°	clear ..	con. veg	normal...	......	sl. marshy......	.0042	.0148	....	..	.0000	.1777	...	....	...	...	....	2.20	....
694	July 14	69°	slight..	cons...	......	faintly veg	dist. veg......	....	....	....	...	...	....	...	....	...	...	...	...	...
733	23	69°	v. slight	cons...	0.25	dist. veg....	dist. veg......	.0028	.0116	...	....	.0000	.0850	...	....	...	....	5.1	2.23	....
761	29	64°	v. slight	cons...	0.30	faintly veg......	dist. veg	.0048	.0116	...	..	.0000	.0800	0.36	13.40	5.10	8.30	5.1	2.46	....
794	Aug 5	68°	v. slight	cons..	0.20	faintly veg......	dist. veg	.0036	.0080	.0078	.0002	.0001	.0700	0.22	13.70	3.30	10.40	4.4	2.35	....
840	12	60°	v. slight	cons...	0.12	v. faintly veg.	faintly veg......	.0080	.0140	.0104	.0036	.0000	.0930	0.15	12.30	3.10	9.20	4.9	2.38	....
881	19	..	v. slight	slight..	0.17	faintly veg	faintly veg	.0056	.0072	.0066	.0006	.0001	.0550	0.13	13.80	3.70	10.10	5.1	2.72	....
924	26	68°	v. slight	cons...	0.15	v. faintly veg......	faintly veg	.0042	.0110	.0088	.0022	.0001	.0600	0.16	13.90	3.70	10.20	5.3	2.53	....
963	Sept 1	67°	v. slight	cons...	0.15	v. faintly veg	v. faintly veg......	.0040	.0060	.0060	.0000	.0001	.0530	0.16	14.80	4.00	10.80	5.3	2.79	....
998	16	65°	none...	cons...	0.05	faintly veg......	v. faintly veg......	.0042	.0086	.0072	.0014	.0002	.0670	0.08	12.40	2.90	9.50	4.6	2.52	.0070
1008	27	61°	v. slight	cons...	0.09	v. faintly veg	v. faintly veg......	.0032	.0064	.0058	.0006	.0001	.0650	0.14	11.90	2.80	9.10	4.3	2.54	.0050

CHEMICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN No. 2 (CENTRAL); OUTLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid Total	Ammonia: Albuminoid In Solution	Ammonia: Albuminoid In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																			
416	May 3	57°	sl. turb	sl. veg.	sl. straw..	…	sl. marshy…	.0000	.0078	…	…	.0000	.1647	…	10.10	4.50	5.60	…	1.80	…
450	10	62°	sl. turb	sl. veg.	sl. straw..	…	sl. marshy…	.0000	.0118	…	…	.0000	.1647	…	…	…	…		1.50	…
475	17	61°	sl. turb	…	sl. straw..	…	sl. marshy…	.0000	.0068	…	…	.0000	.1647	…	…	…	…	…	1.70	…
519	24	61°	clear..	none…	sl. straw..	…	none…	.0000	.0060	…	…	.0000	.1070	…	…	…	…	…	1.25	…
563	June 1	61°	sl. turb.	none…	normal ..	…	sl. veg …	.0000	.0060	…	…	.0000	.1482	…	11.80	6.20	5.60	…	1.75	…
599	7	63°	sl. turb	none…	sl. straw..	…	none…	.0000	.0035	…	…	.0000	.1812	…	…	…	…	…	1.70	…
679	17	64°	clear..	none…	normal ..	…	sl. marshy…	.0000	0245	…	…	.0000	.1400	…	…	…	…	…	1.85	…
692	July 14	71°	v. slight	slight..	…	faintly veg …	dist. veg …	…	…	…	…	…	…	…	…	…	…	…	…	…
731	23	70°	v. slight	v. slight	0.30	dist. veg…	dist. veg …	.0016	.0128	…	…	.0001	.0700	…	…	…	…	3.8	1.91	…
759	29	66°	v. slight	slight..	0.37	dist. veg …	dist. veg …	.0038	.0122	…	…	.0000	.0630	0.40	12.20	5.00	7.20	3.2	1.98	…
792	Aug 5	69°	v. slight	slight	0.32	faintly veg …	dist veg …	.0026	.0112	.0092	0020	.0001	.0800	0.30	11.50	3.20	8.30	3.9	2.19	…
838	12	69°	v. slight	slight..	0.20	faintly veg …	faintly veg …	.0010	.0122	.0114	.0008	.0000	.0800	0.22	10.70	2.80	7.90	4.3	1.86	…
879	19	…	v. slight	v. slight	0.19	dist. veg…	faintly veg …	.0032	.0114	0092	.0022	.0001	.0750	0.17	12.30	3.70	9.60	3.9	2.28	…
922	26	69°	v. slight	slight .	0.17	v. faintly veg …	faintly veg…	0040	.0096	.0090	.0006	.0001	.0650	0.14	12.00	3.50	8.50	4.4	2.18	…
961	Sept 1	68°	v. slight	v. slight	0.16	v. faintly veg…	v. faintly veg …	.0018	0086	0078	.0008	.0002	.0430	0.15	12.30	3.30	9.00	4.4	2.45	…
996	16	66°	v. slight	slight..	0.06	faintly veg …	faintly veg …	.0012	.0114	.0070	.0044	.0002	.0630	0.09	11.60	3.20	8.40	4.3	2.28	.0050
1006	27	60°	v. slight	slight..	0.07	v. faintly veg…	faintly veg…	.0006	.0072	.0062	.0010	.0001	.0500	0.16	10.80	2 60	8 20	3.6	2.23	.0100

MICROSCOPICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN No. 1; OUTLET. (No. per c. c.)

TABLE

Number	205	231	258	293	321	369	416	452	532	563	602	630	663	707	750	793	828	863	873
Date of Collection	1897 Apl 19	Apl 26	May 3	May 10	May 17	May 24	J'ne 1	Jn'e 7	J'ne 17	July 14	July 23	July 29	Aug 5	Aug 12	Aug 19	Aug 26	Sept 1	Sept 16	Sept 27
Temperature		60°	57°	61°	62°	62°	61°	62°	65°	74°	72°	67°	70°	75°		69°	69°	66°	60°
Diatomaceæ	4970	1646	686	960	1236	6460	7512	2532	7280	19	330	75	99	105	397	2243	1036	5496	4400
Asterionella	3500	1636	667	782	944	6000	7200	2400	7040	17	329	20	18	41	96	30	48	1336	1008
Cyclotella								12											
Melosira	464		14	100	284	220	300	100				53	62	64	12	92	16	160	192
Navicula													5		5				
Synedra	1005	7	5	71	8	240	8	16	240				14		284	2118	972	4000	3200
Cyanophyceæ			11			40	16				2	1	15	16	15	38	38	4	
Anabæna			5																
Clathrocystis						20	16												
Microcystts															10				
Oscillaria			6			20							14	15	5	38	38		
Algæ	2	17		3	8	60	4	32	8		6	4	3	23	11	78	124	16	16
Dictyosphærium																75	112		
Gonium																	8		
Pandorina														9				8	
Pediasilum						20													
Protococcus		17				20								5	5				
Raphidium								24											
Scenedesmus						20		8											
Fungi													1						
Rhizopoda				1							2	2		3					

Continued on next page.

MICROSCOPICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN No. 1; OUTLET.—Continued.

TABLE

Infusoria	1	1	1	10	8	..	16	44	16	..	9	1	147	138	24	179	32	8	16
Dinobryon							8	28	12										
Dinobryon Cases				9			8						6			5			
Euglena								16											
Monas											6		6	14					16
Trachelomonas														10	17	168	30		
Mallomonas													129	111					
Vermes						20				1	1		1	1				8	8
Rotifer						20												8	8
Total Organisms	4973	1664	698	974	1252	6580	7548	2608	7304	20	352	83	266	286	447	2538	1230	5532	4444
Total Genera	6	5	6	10	6	9	7	9	6	3	10	8	16	18	17	14	10	10	10

BACTERIAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN No. 1; OUTLET. (No. per c. c.)

TABLE

Bacteria	135	....	140	200	80	70	120	80	80	....	220	3000	700	800	400	300	100	800	below 100
Meteorological Statistics.																			
Rain-fall in inches week preceding	1.00	.02	1.39	.07	3.01	.38	1.54	.70	.01	3.67	2.21	3.85	1.03	.39	.58	2.15	.00	.00	1.20
Date	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	46°	53°	54°	60°	60°	60°	62°	61°	68°	75°	75°	70°	73°	73°	73°	70°	69°	68°	60°

The genera, in addition to those enumerated in the tables as present in quantities of five or more organisms per c. c. in any one sample, were: ***Diatoms***—Amphiprora, Gomphonema, Meridion, Tabellaria: ***Cyanophyceæ***—Anabaena, Clathrocystis, Oscillaria; ***Algæ***—Arthrodesmus, Cœlastrum, Clostrum, Cosmarium, Eudorina, Pediastrum, Raphidium, Scenedesmus Staurastrum, Zygnema Volvox, Xanthidium: ***Infusoria***—Cryptomonas, Peridinium, Uroglena, Glenodinium; ***Vermes***—Anurea, Polyartha; ***Fungi***—Molds.

MICROSCOPICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR; BASIN No. 1. INLET (No. per c. c.) TABLE

Number	230	261	296	324	372	419	455	535	566	605	633	666	710	753	796	831	866	876
Date of Collection	1897 Ap'l 26	May 3	May 10	May 17	May 24	J'ne 1	J'ne 7	J'ne 17	July 14	July 23	July 29	Aug 5	Aug 12	Aug 19	Aug 26	Sept 1	Sept 16	Sept 27
Temperature	60°	58°	60°	61°	61°	62°	64°	65°	69°	59°	64°	69°	69°	....	68°	67°	65°	61°
Diatomaceæ	21	26	129	20	67	34	1	11	144	95	21	32	68	4	81	4	221	316
Asterionella									65									
Melosira	10	26	39	12	61	33		10	65	94	13	29	68		73		219	308
Navicula																		8
Synedra	6		86	7														
Tabellaria	5																	
Cyanophyceæ		2	2	2	7		3	57	1			2	17	8	21	11	6	
Clathrocystis								55										
Oscillaria													14	6	21	7	5	
Algæ		1	2		1	1	1		4	1	3	1	1		1		2	12
Dictyosphærium																		8
Fungi						1						2						
Infusoria	7	3	16		2	7	5	3		10	2	2	2	6	8	1	4	
Dinobryon	5		5			6				5								
Vermes			1				10											
Total Organisms	28	32	150	22	77	43	5	71	149	106	26	39	88	18	111	16	233	328
Total Genera	4	4	11	4	8	5		5	10	5	7	9	8	7	11	7	8	4

BACTERIAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR; BASIN No. 1. INLET TABLE

Bacteria	....	1500	50	225	160	330	1320	110	...	210	2000	400	600	1600	600	500	300	400
Meteorological Statistics.																		
Rain-fall in inches week preceding	.02	1.39	.07	3.01	.38	1.54	.70	.01	3.67	2.21	3.85	1.03	.39	58	2.15	.00	.00	1.20
Date	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	53°	54°	60°	60°	60°	62°	61°	68°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

MICROSCOPICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN No. 2; INLET.

(No. per c. c.)

TABLE

Number	229	262	297	325	373	420	456	536	567	606	634	667	711	754	797	832	867	877
Date of Collection	Apl 26	May 3	May 10	May 17	May 24	J'ne 1	J'ne 7	J'ne 17	July 14	July 23	July 29	Aug 5	Aug 12	Aug 19	Aug 26	Sept 1	Sept 16	Sept 27
Temperature	60°	58°	60°	61°	61°	62°	64°	64°	69°	69°	66°	68°	66°	...	68°	67°	65°	60°
Diatomaceæ	25	16	3	49	59	27	3	...	54	39	27	22	5	8	82	8	154	296
Melosira	16	14	...	39	50	19	...	...	42	39	27	19	...	6	81	...	151	296
Synedra	5	...	...	10	8	6	...	...	...	...	...	...	...	...	...	...	...	...
Cyanophyceæ	...	4	...	1	4	1	6	47	1	5	7	...	12	8	2	5	5	2
Clathrocystis	...	...	...	...	...	...	...	47	...	5	7		.	...	...	...	.	...
Oscillaria	...	...	...	...	...	...	...	...	...	...		...	6	7	...	5	...	...
Algæ	1	...	...	...	1	2	2	...	4	...		4	2	...	1	1	3	8
Fungi	...	...	...	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...
Infusoria	4	1	...	1	7	13	8	...	...	2	4	3	1	1	2	1	1	...
Dinobryon	...	...	...	...	...	6	8	...	...	...	...	...	...	...	...	...	...	...
Dinobryon Cases	...	...	...	...	5	7	...	...	...		...	...	...	...	...	...	...	...
Vermes	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...
Crustacea	...	...	...	...	...	...	...	...	1	.	...	...	...	...	...	...	...	...
Total Organisms	30	21	3	51	72	44	19	47	60	47	40	29	20	17	87	15	163	306
Total Genera	8	8	2	4	8	9	7	1	11	4	6	8	10	6	6	7	8	5

BACTERIAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN No. 2; INLET.

(No. per c. c.)

TABLE

Bacteria	...	540	75	190	140	330	150	100	...	230	25000	900	400	300	200	200	700	600
Meteorological Statistics.																		
Rain-fall in inches for week preceding	.02	1.39	.07	3.01	.38	1.54	.70	.01	3.67	2.21	3.85	1.03	.39	.58	2.15	.00	.00	1.17
Date	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 22	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature for week preceding	53°	54°	60°	60°	60°	62°	61°	68°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

MICROSCOPICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN No. 2; OUTLET. (No. per c c.)

Number	232	259	292	322	370	417	453	533	564	603	631	664	708	751	794	829	864	874
Date of Collection	1897 Apl 26	May 3	May 10	May 17	May 24	J'ne 1	J'ne 7	J'ne 17	July 14	July 23	July 29	Aug 5	Aug 12	Aug 19	Aug 26	Sept 1	Sept 16	Sept 27
Temperature	60°	58°	62°	61°	61°	61°	63°	64°	71°	71°	66°	69°	69°	...	69°	68°	66°	65°
Diatomaceæ	42	32	104	64	300	516	1280	1708	182	89	39	41	49	9	44	38	45	333
Asterionella	6	...	...	12	105	450	1240	4272	63	...	5	...	...	8	8	37	8	8
Melosira	28	15	30	50	133	56	10	20	86	89	33	37	48	...	9	...	36	303
Synedra	6	17	68	...	59	...	28	408	32	...	...	...	...	...	26	...	...	21
Cyanophyceæ	1	2	...	4	4	10	...	...	6	...	4	7	...	3	7	...	5	1
Clathrocystis	...	...	...	...	...	8	...	...	6	...	...	...	...	...	...	...	...	...
Oscillaria	...	...	...	...	...	...	...	...	...	...	...	6	...	...	7	...	...	...
Algæ	6	...	3	1	9	2	9	...	10	13	2	...	1	1	2	1	...	3
Protococcus	...	...	...	...	8	...	...	...	...	10	...	...	...	...	...	...	...	...
Scenedesmus	...	...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	...	...
Fungi	1	...	1	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...
Rhizopoda	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
Infusoria	4	4	5	2	7	8	51	32	12	12	16	10	...	2	2	...	7	17
Dinobryon	...	...	...	...	...	6	18	32	...	...	...	...	...	...	...	...	...	...
Dinobryon Cases	...	...	...	...	...	...	32	...	11	...	6	...	...	...	...	...	...	...
Monas	...	...	...	...	...	...	...	...	...	10	6	...	...	...	...	...	...	6
Mallomonas	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5
Vermes	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...
Total Organisms	54	38	113	72	321	536	1340	4740	211	114	62	58	50	15	55	39	57	354
Total Genera	12	5	9	8	11	9	12	6	13	6	10	9	3	6	9	3	8	11

BACTERIAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN No. 2; OUTLET. (No. per c c.) TABLE

Bacteria	...	720	155	150	160	180	170	115	...	155	26500	190	160	600	500	15500	200	200
Meteorological Statistics.																		
Rain-fall in inches week preceding	0.2	1.39	.07	3.01	.38	1.54	.70	.01	3.67	2.21	3.85	1.03	.39	.58	2.15	.00	.00	1.20
Date	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	53°	54°	60°	60°	60°	62°	61°	68°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

The genera found in addition to those above tabulated as occurring in quantities of five or more per C.C. in any one sample, were as follows: ***Diatoms***—Amphora, Cyclotella, Eunotia, Cymbella, Gomphonema, Navicula, Nitzschia, Pleurosigma; ***Cyanophyceæ***—Microcystis; ***Algæ***—Arthrodesmus, Cosmarium, Dictyosphærium, Pandorina, Pediastrum, Raphidium, Staurastrum, Spirogyra; ***Infusoria***—Glenodinium, Peridinium, Trachelomonas; ***Vermes***—Anguillula, Anurea. ***Crustacea***—Daphnia; ***Fungi***—Molds.

CHEMICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN No. 3 (WESTERN); OUTLET.

(Parts per 100,000.)

No.	Date of Collection	Tem.	APPEARANCE: Turbidity	Sediment	Color	ODOR: Cold	Hot	AMMONIA: Free	ALBUMINOID: Total	In Solution	In Suspension	NITROGEN AS: Nitrites	Nitrates	Oxygen Consumed	RESIDUE ON EVAPORATION: Total	Loss on Ignition	Fixed	Hardness	Chlorine	Iron
	1897																			
370	Apl 19	...	...	...	...	...	...	.0000	.0170	...	...	.0000	.1318	...	9.20	3.60	5.60	...	1.30	...
417	May 3	56°	...	sl. sed.	...	...	marshy	.0000	.0104	...	...	.0000	.1482	...	8.90	4.70	4.20	...	1.50	...
451	10	59°	sl. turb.	sl. veg.	sl. straw	...	sl. marshy	.0000	.0132	...	...	.0000	.1341	...	...	...	...	...	1.80	...
476	17	61°	sl. turb.	none	sl. straw	...	sl. marshy	.0000	.0138	...	...	.0000	.1812	...	...	...	...	...	1.50	...
520	24	61°	min veg	none	sl. straw	...	sl. marshy	.0000	.0190	...	...	.0000	.1760	...	...	...	...	...	1.50	...
564	June 1	61°	sl. turb.	none	normal	...	md. veg.	.0000	.0255	...	...	.0000	.1341	...	10.20	5.00	5.20	...	1.55	...
600	7	63°	sl. turb.	none	sl. straw	...	sl. marshy	.0000	.0195	...	...	.0000	.0988	...	...	...	...	...	1.55	...
680	17	64°	sl. turb.	min veg	normal	...	md. veg.	.0000	.0125	...	...	.0000	.1647	...	...	...	...	...	1.90	...
693	July 14	70°	v. slight	slight	...	aromatic & faint. veg.	dist. veg.	...	...	...	...	...	...	...	...	...	...	...	...	...
732	23	70°	v. slight	slight	0.35	dist. veg.	dist. veg.	.0056	.0130	...	...	.0000	.0670	...	...	...	...	3.9	1.71	...
760	29	67°	v. slight	slight	0.43	faintly veg	dist. veg.	.0034	.0100	...	...	.0000	.0600	0.47	11.00	4.90	6.10	4.3	1.78	...
793	Aug 5	69°	v. slight	slight	0.40	faintly veg.	dist. veg.	.0022	.0120	.0080	.0040	.0000	.0630	0.35	9.70	3.10	6.60	2.7	1.78	...
839	12	69°	v. slight	slight	0.30	faintly veg.	faintly veg	.0012	.0178	.0170	.0008	.0000	.0350	0.28	9.00	2.50	6.50	3.2	1.62	...
880	19	.	v. slight	v. slight	0.20	faintly veg.	faintly veg	.0022	.0086	.0076	.0010	.0001	.0450	0.19	10.50	3.80	6.70	3.1	1.80	...
923	26	69°	v. slight	slight	0.19	v. faintly veg	faintly veg	.0012	.0076	.0072	.0004	.0001	.0600	0.17	11.10	3.80	7.30	3.5	1.87	...
962	Sept 1	68°	v. slight	v. slight	0.17	v. faintly veg	v. faintly veg.	.0012	.0090	.0064	.0026	.0001	.0550	0.18	11.20	3.00	8.20	3.8	1.98	...
997	16	55°	v. slight	cons...	0.06	faintly veg.	faintly veg & aromatic	.0012	.0128	.0094	.0034	.0002	.0470	0.11	10.40	2.90	7.50	3.5	1.96	.0050
1007	27	60°	v. slight	slight	0.07	v. faintly veg	faintly veg	.0006	.0098	.0066	.0032	.0001	.0450	0.14	9 60	2.50	7.10	3.2	1.91	.0100

CHEMICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN NO. 3 (WESTERN); INLET. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																			
371	Apl 19	..	......	......	......	....	....	.0012	.0064	....	....	.0000	.1108	....	8.60	3.20	5.40	..	1.35	....
420	May 3	56°	slight..	sl. veg.	sl. straw	....	marshy	.0019	.0055	....	....	.0000	.1631	....	10.00	5.30	4.70	....	1.40	....
454	10	59°	slight..	none ..	sl. straw..	....	sl. marshy	.0017	.0073	....	....	.0000	.1468	...	.....	..	..	...	1.20	..
479	17	60°	slight..	sl. veg.	sl. straw..	....	sl. marshy	.0017	.0073	....	....	.0000	.1633	....	.....	.	...	...	1.55	..
523	24	59°	clear ..	sl. veg.	sl. straw	....	none	.0026	.0049	..	....	.0000	.1378	...	...	...	...	...	1.55	....
567	June 1	61°	slight..	sl. veg.	normal...	....	none	.0020	.0075	....	..	.0000	.1383	....	9.70	3.30	6.40	3.6	1.35	....
603	7	61°	slight	none ..	sl. straw	....	sl. marshy	.0025	.0050	....	..	.0000	.1461	....	....	....	....	....	1.25	..
683	17	63°	clear ..	sl. veg.	normal...	....	md. marshy	.0024	.0146	....	...	.0000	.1298	....	....	....	....	...	1.50	....
696	July 14	69°	slight..	cons. ..	....	faintly veg	dist. veg	....	....	....	...	....	....	....	....	....	....	...	..	....
735	23	68°	v slight	cons. ..	0.30	dist. veg	dist. veg	.0022	.0120	....	....	.0000	.0650	...	.....	..	....	3.1	1.55	....
763	29	63°	v slight	cons. .	0.45	faintly veg	dist. veg	.0034	.0098	....	...	.0000	.0630	0.49	9.50	3.50	6.00	2.9	1 62	..
796	Aug 5	67°	v. slight	cons. .	0.30	faintly veg	dist. veg	.0034	.0086	.0076	.0010	.0001	.0630	0.28	10.30	2.50	7.80	3.5	1.96	....
842	12	66°	v. slight	cons. ..	0.17	v. faintly veg	faintly veg	.0056	.0134	.0134	.0000	.0000	.0650	0.24	9.20	2.60	6.60	3.5	1.64	....
883	19	.	v. slight	slight ..	0.22	faintly veg	faintly veg	.0018	.0088	.0088	.0000	.0000	.0400	0.21	9.40	3.10	6.30	2.7	1.67	....
926	26	68°	v. slight	cons. ..	0.20	v. faintly veg	faintly veg	.0036	.0102	.0090	.0012	.0000	.0500	0.21	10.80	3.20	7.60	3.8	1.84	....
965	Sept 1	66°	v. slight	cons. ..	0.20	faintly veg	faintly veg	.0028	.0076	.0070	.0006	.0001	.0430	0.18	9.30	2.80	6.50	3.4	1.76	....
1000	16	65°	v. slight	cons. ..	0.05	faintly veg	v. faintly veg	.0038	.0066	.0062	.0004	.0000	.0450	0.07	9.70	3.00	6.70	3.5	1.66	.0050
1010	27	61°	v. slight	cons. ..	0.07	v. faintly veg	v. faintly veg	.0012	.0060	.0056	.0004	.0001	.0550	0.08	9.20	2.20	7.00	3.2	1.86	.0050

MICROSCOPICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN No. 3; OUTLET. (No. per c.c.)

Number	202	235	200	295	323	371	418	454	534	565	604	632	665	709	752	795	830	865	875
Date of Collection	1897 Apl 19	Apl 26	May 3	May 10	May 17	May 24	June 1	June 7	J'ne 17	July 14	July 23	July 29	Aug 5	Aug 12	Aug 19	Aug 26	Sept 1	Sept 16	Sept 27
Temperature	...	58°	56°	59°	61°	61°	61°	63°	64°	70°	70°	67°	68°	69°	...	69°	69°	65°	60°
Diatomaceæ	968	1377	1205	2216	3596	20280	10964	16037	8016	9912	1220	14	29	25	29	22	53	828	1534
Asterionella	845	1317	1141	2144	3400	20000	10800	16000	8000	9800	1212	5	22	14	5	9	21	28	66
Cyclotella	...	...	...	...	68	...	...	10	...	...	...	...	...	...	...	...	...	...	...
Melosira	23	13	28	16	92	100	44	20	...	16	...	...	...	7	6	...	...	340	858
Synedra	95	41	35	40	36	...	120	6	...	96	...	6	...	...	18	12	29	460	610
Tabellaria	5	...	...	16	...	...	...	...	...	...	8	...	...	...	...	...	...	...	...
Cyanophyceæ	6	3	1	8	4	120	16	1	...	...	4	1	1	8	...	1	1	...	...
Anabæna	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Clathrocystis	...	...	...	8	...	...	16	...	...	...	...	...	...	...	...	...	...	...	...
Oscillaria	...	...	...	...	...	120	...	...	...	...	...	...	...	6	...	...	...	...	...
Algæ	8	5	3	...	4	20	...	14	4	4	4	...	1	1	2	...	11	...	8
Dictyosphærium	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11	...	...
Eudorina	...	...	...	...	...	20	...	...	...	...	...	...	...	...	...	...	...	...	...
Protococcus	...	5	...	...	...	...	...	6	...	...	...	...	...	...	...	...	...	...	...
Scenedesmus	...	...	...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	...	...
Infusoria	1	3	...	4	...	...	...	13	...	8	...	2	...	24	6	1	3	32	36
Dinobryon	...	...	...	...	...	...	...	13	...	...	...	...	...	...	...	...	...	8	...
Dinobryan Cases	...	...	...	...	...	...	...	...	...	8	...	...	...	...	...	...	...	...	...
Euglena	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6
Monas	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	20	16
Mallomonas	...	...	...	...	...	...	...	...	...	...	...	...	...	18	5	...	...	...	...
Vermes	...	...	...	...	...	20	...	2	...	...	...	...	...	...	...	1	...	...	2
Rotifer	...	...	...	...	...	20	...	...	...	...	...	...	...	...	...	...	...	...	...
Total Organisms	983	1388	1209	2228	3604	20440	10980	16067	8020	9924	1228	17	31	58	37	25	68	860	1580
Total Genera	9	10	7	6	6	6	4	11	6	5	4	5	7	9	7	6	8	6	13

BACTERIAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR, BASIN No. 3; OUTLET. TABLE

Bacteria	90	...	185	85	85	200	260	160	90	...	120	6000	1100	300	300	600	600	200	800
Meteorological Statistics.																			
Rain-fall in inches week preceding	1.00	.02	1.39	.07	3.01	.38	1.54	.70	.01	3.67	2.21	3.85	1.03	.39	.58	2.15	.00	.00	1.20
Date	Apl 24	May 1	May 8	May 15	May 22	May 29	June 5	June 12	J'ne 19	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week ending	46°	53°	54°	60°	60°	60°	62°	61°	68°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

The genera found at the outlet of this basin, in addition to the forms tabulated above, as occurring in quantities of five or more per C. C. in any one sample, are as follows: ***Diatoms***—Eunotia, Meridion, Navicula, Pleurosigma; ***Cyanophyceæ***—Aphanocapsa; ***Algæ***—Pandorina, Pediastrum, Raphidium, Gonium, Euastrum; ***Infusoria***—Cryptomonas, Peridinium, Trachelomonas; ***Vermes***—Anuræa.

MICROSCOPICAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR,
BASIN No. 3; INLET. (No. per c. c.)

TABLE.

Number	203	236	263	298	326	374	421	457	535	568	607	635	668	712	755	798	833	868	878
Date of Collection	1897 Apl 19	Apl 26	May 3	May 10	May 17	May 24	J'ne 1	J'ne 7	J'ne 17	July 14	July 23	July 29	Aug 5	Aug 12	Aug 19	Aug 26	Sept 1	Sept 16	Sept 27
Temperature	....	57°	57°	59°	60°	59°	61°	61°	63°	69°	68°	63°	67°	66°	...	68°	66°	65°	61°
Diatomaceæ	42	7	6	51	14	45	10	2	..	33	6	10	24	16	4	75	7	83	22
Melosira	6	7	....	33	10	37	...	....	..	29	5	8	22	14	....	74	5	83	20
Synedra	25	....	...	15	....	...	..	...	...	...	....	....	...	...	....	...	...	....	...
Tabellaria	5	....	....	..	...	....	..	..	....	...	...	....	....	....	....	....	...	....	....
Cyanophyceæ	2	....	....	....	3	1	4	2	19	....	1	1	1	2	5	9	...	1	....
Clathrocystis	....	....	....	...	....	....	...	...	19	...	....	....	....	...	....	..	....	....	...
Oscillaria	...	....	..	...	...	...	....	....	....	....	....	...	....	..	...	8	....	..	...
Algæ	2	..	1	....	1	3	1	3	..	...	..	...	....	1	....	2	...	1	....
Fungi	...	..	...	1	....	..	....	..	...	...	....	1	....	...	1	1	..	....	..
Rhizopoda	....	....	....	....	...	...	1	...	...	..	..	....	....	..	...	..	....	....	...
Infusoria	...	1	...	3	....	3	2	2	3	1	3	2	2	1	2	..	....	1	....
Total Organisms	48	8	7	55	18	52	18	9	22	34	10	14	27	20	12	87	7	86	22
Total Genera	11	2	4	5	6	8	8	5	2	6	4	7	6	6	6	7	3	4	2

BACTERIAL EXAMINATION OF WATER FROM RIDGEWOOD RESERVOIR,
BASIN No. 3; INLET. (No. per c. c.)

TABLE.

Bacteria	205	...	540	120	180	135	200	700	110	....	130	10400	1300	600	500	1300	100	400	300
Meteorological Statistics.																			
Rain-fall in inches week preceding.	1.00	.02	1.39	.07	3.01	.38	1.54	.70	.01	3.67	2.21	3.85	1.03	.39	.58	2.15	.00	.00	1.20
Date	Apl 24	May 1	May 8	May 15	May 22	May 29	J'ne 5	J'ne 12	J'ne 19	July 17	July 24	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 4	Sept 18	Oct 2
Mean temperature week preceding.	46°	53°	54°	60°	60°	60°	62°	61°	68°	75°	74°	70°	73°	73°	73°	70°	69°	68°	60°

EXAMINATION OF WATER FOR APPEARANCE, ODOR AND COLOR; TAP; 108 DEKALB AVENUE, BROOKLYN.

No.	Date of Collection		Tem.	Appearance			Odor	
				Turbidity	Sediment	Color	Cold	Hot
789	Aug	4	..	v. slight	cons. ..	0.40	faintly veg.........	faintly veg..........
833		12	71°	none...	cons. ..	0.25	v. faintly veg.......	faintly veg..........
876		18	....	v. slight	slight..	0.18	v. faintly veg........	v. faintly veg.......
919		25	70°	v. slight	cons. ..	0.16	v. faintly veg...	v. faintly veg... ....
958		31	....	none...	cons. ..	0.15	v. faintly veg	v. faintly veg........
971	Sept	9	...	v. slight	slight..	0.12	v. faintly veg.... .	v. faintly veg........
993		15	....	v. slight	slight..	0.08	v. faintly veg.......	v. faintly veg ....
1003		23	...	v. slight	cons. ..	0.07	v. faintly veg.... ...	none ....
1059	Oct	1	63°	v. slight	cons. ..	0.10	v. faintly veg	v. faintly veg........

EXAMINATION OF WATER FOR APPEARANCE, ODOR AND COLOR. TAP; COR. FOURTH AND ATLANTIC AVENUES, BROOKLYN.

757	July	28	....	v. slight	slight..	0.35	faintly veg.	dist. veg............
790	Aug	4	...	v. slight	cons. .	0.35	faintly veg	faintly veg.... .....
834		12	70°	v. slight	cons. ..	0.20	v. faintly veg.......	faintly veg.... .....
877		18	....	v. slight	cons. ..	0.18	v. faintly veg... ...	v. faintly veg.. .....
920		25	69°	v. slight	cons. ..	0.17	v. faintly veg	v. faintly veg........
959		31	...	none .	cons. ..	0.15	v. faintly veg	v. faintly veg........
972	Sept	9	....	v. slight	cons. ..	0.12	v. faintly veg	v. faintly veg... . .
994		15	....	v. slight	slight..	0.06	v. faintly veg. & unpl't	v. faintly veg.. .....
1004		23	...	v. slight	cons. ..	0.07	v. faintly veg.......	none ....
1060	Oct	1	65°	v. slight	slight..	0.10	v. faintly veg........	v. faintly veg........

MICROSCOPICAL EXAMINATION OF WATER FROM
108 DeKALB AVENUE ; TAP.

(No. per c. c.) TABLE

Number	661	705	748	791	839	861	871	927
Date of Collection	1897 Aug 4	Aug 11	Aug 18	Aug 24	Sept 9	Sept 16	Sept 22	Oct 1
Temperature	...	70°	...	70°	...	..	....	....
Diatomaceæ	2392	175	150	297	353	1596	2124	1890
Asterionella	2352	159	114	134	29	316	308	310
Melosira	40	14	35	5	97	20	736	573
Navicula	...	....	...	....	...	....	.	13
Synedra	....	....	...	157	726	1260	1080	978
Tabellaria	...	...	....	....	...	....	....	16
Cyanophyceæ	8	2	1	1	...	....	...	....
Algæ	..	3	2	11	1	4	....	1
Dictyosphærium	...	....	...	8	....	...	..	...
Fungi	12	....	....	2	....	....	....	..
Rhizopoda	..	1	....	..	..	...	....	....
Infusoria	4	17	43	13	3	4	8	3
Monas	..	6	...	....	..	....	..	....
Trachelomonas	...	....	...	10	...	...	....	.. .
Mallomonas	....	10	37	...	....	...	...	....
Vermes	...	....	...	..	1	4	...	....
Total Organisms	2416	198	196	324	858	1608	2132	1894
Total Genera	6	12	9	13	8	6	5	8

BACTERIAL EXAMINATION OF WATER FROM
108 DeKALB AVENUE ; TAP. TABLE

Bacteria	....	...	..	...	...	....	....	...
Meteorological Statistics.								
Rain-fall in inches for week preceding	2.31	1.14	.58	1.35	.02	.00	.03	.00
Date	Aug 7	Aug 14	Aug 21	Aug 28	Sept 11	Sept 18	Sept 25	Oct 2
Mean temperature week ending	73°	73°	73°	70°	73°	68°	58°	60°

MICROSCOPICAL EXAMINATION OF WATER FROM BROOKLYN, COR. 4TH & ATLANTIC AVES; TAP.

(No. per c. c.) TABLE

Number	629	662	706	749	792	840	862	872	928
Date of Collection	1897 July 28	Aug 4	Aug 12	Aug 18	Aug 24	Sept 9	Sept 16	Sept 22	Oct 1
Temperature	..	...	70°	....	69°	...	..	....	....
Diatomaceæ	133	83	40	84	211	1228	1386	2216	2051
Asterionella	127	61	39	20	56	36	116	184	291
Melosira	..	12	..	24	19	88	70	672	659
Navicula	....	..	...	..	..	.	.	....	33
Synedra	...	7	....	38	133	1104	1200	1360	1051
Tabellaria	..	...	...	..	..	..	..	....	16
Cyanophyceæ	3	2	..	4	3	....	..	...	...
Algæ	.	13	2	3	18	12	2	4	3
Dictyosphærium	...	...	....	....	11	....	...	...	...
Raphidium	...	....	..	....	6	...	...	....	...
Scenedesmus	...	9	..	..	....	..	..	..	....
Fungi	...	5	...	...	...	..	....	....	....
Rhizopoda	....	....	2	....	...	...	..	....	....
Infusoria	4	6	2	3	24	2	2	16	9
Dinobryon Cases	..	...	....	.	..	..	..	...	6
Monas	....	..	..	..	...	...	..	8	..
Trachelomonas	..		....	..	20	.	..	....	....
Total Organisms	140	109	46	94	256	1242	1390	2236	2063
Total Genera	6	5	7	10	14	7	5	7	12

BACTERIAL EXAMINATION OF WATER FROM BROOKLYN, COR. 4TH & ATLANTIC AVES; TAP.

(No. per c. c) TABLE

Bacteria	..	....	....	...	....	....	..	...	....
Meteorological Statistics.									
Rain-fall in inches week preceding	2.42	2.31	.39	.58	1.35	.02	.00	.03	.00
Date	July 31	Aug 7	Aug 14	Aug 21	Aug 28	Sept 11	Sept 18	Sept 25	Oct 2
Mean temperature week ending	70°	73°	73°	73°	70°	73°	68°	58°	60°

CHEMICAL EXAMINATION OF WATER FROM MASSAPEQUA DRIVEN WELL PLANT: WEIR BOX. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
13	Dec 21	...	...	...	...	...	...	.0024	.0002	...	...	.0000	.0639	...	3.50	...	...	...	.55	...
	1897																			
58	Jan 21	...	...	...	...	...	...	.0011	.0021	...	...	.0000	.0485	...	5.80	...	...	...	.55	...
75	Feb 2	...	...	...	...	...	...	.0015	.0031	...	...	.0000	.0812	...	...	...	...	...	.60	...
99	8	...	...	...	...	...	...	.0010	.0022	...	...	.0000	.0815	...	...	...	...	...	.60	...
142	17	...	...	...	...	...	...	.0014	.0012	...	...	.0000	.0688	...	...	...	...	...	.60	...
160	24	...	...	...	...	...	...	.0011	.0023	...	...	.0000	.0979	...	...	...	...	...	.60	...
198	Mch 3	...	...	...	...	...	...	.0016	.0010	...	...	.0000	.0522	...	5.10	...	...	...	.60	...
215	9	...	...	...	...	...	...	.0009	.0013	...	...	.0000	.0692	...	...	...	...	...	.60	...
307	Apr 1	...	...	...	...	...	...	.0019	.0021	...	...	.0000	.0803	...	...	...	...	...	.55	...
323	6	...	...	...	...	...	...	.0011	.0011	...	...	.0000	.0444	...	5.50	...	...	...	.60	...
582	June 3	53°	clear	none	normal	...	none	.0016	.0038	...	...	.0000	.0522	...	6.00	...	...	...	.60	...
974	Sept 13	52°	none	none	0.00	faintly unpleasant	none	.0026	.0024	...	...	.0000	.0200	0.04	4.20	...	...	1.1	.56	.0230
1046	30	50°	none	none	0.00	faintly unpleasant	none	.0006	.0010	...	...	.0000	.0000	0.09	4.50	...	...	0.9	.46	.0430

CHEMICAL EXAMINATION OF WATER FROM WANTAGH DRIVEN WELL PLANT; WEIR BOX. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
14	Dec 21	...	...	...	...	...	...	.0016	.0010	...	...	.0000	.0217	...	2.80	...	...	...	.45	...
	1897																			
59	Jan 21	...	...	...	...	...	...	.0007	.0019	...	...	.0000	.0488	...	2.90	...	...	...	.45	...
77	Feb 2	...	...	...	...	...	...	.0010	.0026	...	...	.0000	.0651	...	...	...	...	...	.45	...
101	8	...	...	...	...	...	...	.0007	.0005	...	...	.0000	.0554	...	...	...	...	...	.35	...
144	17	...	...	...	...	...	...	.0000	.0000	...	...	.0000	.0865	...	...	...	...	...	.45	...
162	24	...	...	...	...	...	...	.0010	.0016	...	...	.0000	.0609	...	...	...	...	...	.40	...
200	Mch 3	...	...	...	...	...	...	.0010	.0008	...	...	.0000	.0527	...	6.00	...	...	...	.55	...
217	9	...	...	...	...	...	...	.0004	.0014	...	...	.0000	.0573	...	...	...	...	...	.35	...
254	18	...	...	...	...	...	...	.0012	.0016	...	...	.0000	.0525	...	...	...	...	...	.50	...
268	23	...	...	...	...	...	...	.0012	.0012	...	...	.0000	.0525	...	...	...	...	...	.45	...
309	Apr 1	...	...	...	...	...	...	.0002	.0022	...	...	.0000	.0657	...	...	...	...	...	.55	...
325	6	...	...	...	...	...	...	.0002	.0038	...	...	.0000	.0534	...	5.60	...	...	...	.50	...
436	May 5	52°	clear	none	normal	...	none	.0003	.0023	...	...	.0000	.0697	...	5.30	...	...	...	.55	...
584	June 3	54°	clear	none	normal	...	none	.0004	.0026	...	...	.0000	.0697	...	4.80	...	...	...	.45	...
876	Sept 13	54°	v. slight	none	0.00	faintly unpleasant	none	.0024	.0022	...	...	.0000	.0070	0.02	3.90	...	...	0.6	.44	.0230
49	30	56°	none	v. slight	0.00	none	none	.0012	.0022	...	...	.0000	.0070	0.00	4.50	...	...	1.3	.50	.0330

CHEMICAL EXAMINATION OF WATER FROM NEWBRIDGE DRIVEN WELL PLANT (MATAWAN); WEIR BOX. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid Total	Ammonia: Albuminoid In Solution	Ammonia: Albuminoid In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
15	De 21	...	...	...	...	...	...	.0016	.0062	...	...	.0000	.0382	...	3.5°	...	...	...	.45	...
	1897																			
60	Jan 21	...	...	...	...	...	...	.0016	.0024	...	...	.0000	.0553	...	5.30	...	...	...	.80	...
78	Feb 2	...	...	...	...	...	...	.0010	.0018	...	...	.00 0	.0651	...	...	...	...	...	70	...
102	8	...	...	...	...	...	...	.0000	.0014	...	...	.9000	.0659	...	...	...	...	...	.60	...
145	17	...	...	...	...	...	...	.0010	.0016	...	...	.0000	.0692	...	...	...	...	...	.65	...
1050	Sept 30	54°	none...	v. slight	0.05	none ...	none ...	.0014	.0018	...	...	.0000	.0100	0.00	4.00	...	...	...	.50	.0120

CHEMICAL EXAMINATION OF WATER FROM MERRICK DRIVEN WELL PLANT; WEIR BOX. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid Total	Ammonia: Albuminoid In Solution	Ammonia: Albuminoid In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
16	Dec 21	...	...	...	...	...	...	.0016	.0016	...	...	.0000	.0893	...	4.30	...	...	1.5	.55	...
	1897																			
61	Jan 21	...	...	...	...	...	...	.0007	.0026	...	...	.0000	.0900	...	5.2.	...	...	...	.55	...
80	Feb 2	...	...	...	...	...	...	.0003	.0003	...	...	.0000	.0986	...	...	...	...	...	.50	...
104	8	...	...	...	...	...	...	.0007	.0012	...	...	.0000	.1394	...	...	...	...	...	.50	...
147	17	...	...	...	...	...	...	.0005	.0009	...	...	.0000	.1395	...	.. 0	...	...	...	.55	...
202	Mch 3	...	...	...	...	...	...	.0007	.0005	...	...	.0006	.0982	...	4.8.	...	...	...	.60	...
219	9	...	...	...	...	...	...	.0007	.0001	...	...	.0000	.1065	...	...	...	...	...	.60	...
256	18	...	...	...	...	...	...	.0010	.0016	...	...	.0000	.1068	...	...	...	...	...	.65	...
270	23	...	...	...	...	...	...	.0007	.0045	...	...	.0000	.0982	...	...	...	...	...	.60	...
311	Apr 1	...	...	...	...	...	...	.0002	.0014	...	...	.0000	.1069	...	...	...	...	...	.60	...
327	6	...	...	...	...	...	...	.0002	.0004	...	...	.0000	.0987	...	5.00	...	...	...	.60	...
586	June 3	51°	clear...	none ..	normal	...	none ...	.0006	.0034	...	...	.0000	.1066	...	5.50	...	...	...	.60	...
978	Sept 13	54°	none...	none ..	0.00	none ...	none ...	.0014	.0014	...	...	.0000	.0450	0.00	4.20	...	..	0.8	.64	.0000
1053	30	52°	none ..	v. slight	0.05	none ...	none ...	.0010	.0030	...	...	.0000	.0500	0.00	5.60	...	...	1.1	.64	.0300

CHEMICAL EXAMINATION OF WATER FROM EAST MEADOW DRIVEN WELL PLANT (AGAWAM); WEIR BOX. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
24	1896 Dec 29							.0008	.0000			.0000	.0734		11.80			4.8		
62	1897 Jan 21							.0006	.0003			.0000	.0613		8.40				1.80	
94	Feb 5							.0003	.0002			.0000	.0698						1.70	
106	8							.0002	.0003				.1026						1.75	
149	17							.0002	.0004			.0000	.0904						2.30	

CHEMICAL EXAMINATION OF WATER FROM CLEAR STREAM DRIVEN WELL PLANT; TAP. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
11	1896 Dec 17							.0012	.0006			.0000	.2296		6.50			2.4	.60	
53	1897 Jan 19							.0006	.0024			.0000	.2795		8.10				.50	
83	Feb 3							.0000	.0004			.0000	.2800						.50	
115	9							.0002	.0016			.0000	.3292						.40	
138	16							.0009	.0015			.0000	.2792						.55	
172	25							.0008	.0014			.0000	.2793						.60	
194	Mch 2							.0006	.0014			.0000	.2959		8.90				.65	
231	10							.0024	.0028			.0000	.2121						.75	
249	17							.0004	.0003			.0000	.3291						.60	
279	24							.0012	.0030			.0000	.2791						.70	
303	31							.0000	.0012			.0000	.2965						.70	
339	Apr 7							.0004	.0022			.0000	.2467		8.60				.65	
446	May 6	58°	clear	none	normal		none	.0006	.0024			.0000	.2795		8.20				.45	
595	June 4	60°	clear	none	normal		none	.0008	.0030			.0000	.2723		9.30			3.3	.60	
786	Aug 4	65°	none	v. slight	0.03	none	none	.0006	.0038			.0000	.1200	0.04	7.80			1.9	.71	.0300
955	31	58°	none	v. slight	0.00	none	none	.0014	.0030			.0001	.1750	0.04	8.10			2.9	.69	.0400
1028	Sept 28	58°	none	v. slight	0.00	none	none	.0020	.0036			.0000	.2000	0.10	8.80			2.1	.69	.0170

CHEMICAL EXAMINATION OF WATER FROM FOREST STREAM DRIVEN WELL PLANT: TAP. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid Total	Ammonia: Albuminoid In Solution	Ammonia: Albuminoid In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
9	Dec 17	...	...	...	...	...	...	.0054	.0033	...	...	.0000	.0779	...	5.70	...	...	2.5	.65	...
	1897																			
52	Jan 19	...	...	...	...	...	...	.0026	.0020	...	...	.0000	.0802	...	7.70	...	...	2.6	.60	...
91	Feb 4	...	...	...	...	...	...	.0021	.0013	...	...	.0000	.0929	...	...	...	...	...	.60	...
112	9	...	...	...	...	...	...	.0032	.0018	...	...	.0000	.1715	...	...	...	...	...	.55	...
135	16	...	...	...	...	...	...	.0044	.0000	...	...	.0000	.1364	...	...	...	...	...	.60	...
170	25	...	...	...	...	...	...	.0042	.0006	...	...	.0000	.1118	...	...	...	...	...	.65	...
191	Mch 2	...	...	...	...	...	...	.0088	.0016	...	...	.0000	.0916	...	7.30	...	...	2.8	.60	...
228	10	...	...	...	...	...	...	.0056	.0030	...	...	.0000	.0942	...	...	...	...	...	.60	...
246	17	...	...	...	...	...	...	.0030	.0016	...	...	.0000	.1046	...	...	...	...	...	.60	...
276	24	...	...	...	...	...	...	.0032	.0016	...	...	.0000	.1209	...	...	...	...	...	.45	...
300	31	...	...	...	...	...	...	.0028	.0020	...	...	.0000	.1212	...	...	...	...	...	.65	...
336	Apr 7	...	...	...	...	...	...	.0040	.0020	...	...	.0000	.1120	...	6.80	...	...	...	.60	...
443	May 6	57°	clear	none	normal	...	none	.0032	.0044	...	...	.0000	.0879	...	8.20	...	...	...	.60	...
592	June 4	58°	clear	none	normal	...	none	.0064	.0030	...	...	.0000	.0936	...	10.70	...	...	...	.60	...
783	Aug 4	60°	v. slight	cons.	0.08	none	none	.0050	.0092	...	...	.0000	.0200	0.05	6.00	...	...	2.3	.61	...
952	31	60°	v. slight	slight	0.06	none	none	.0058	.0026	...	...	.0001	.0300	0.04	6.10	...	...	1.9	.61	.1000
1024	Sept 28	58°	v. slight	cons.	0.05	none	none	.0072	.0040	...	...	.0000	.0350	0.06	5.30	...	...	1.8	.61	.0400

CHEMICAL EXAMINATION OF WATER FROM JAMECO PARK DRIVEN WELL PLANT, DEEP WELLS; TAP. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid Total	Ammonia: Albuminoid In Solution	Ammonia: Albuminoid In Suspension	Nitrogen as Nitrites	Nitrogen as Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
19	Dec 22	...	...	...	...	...	...	.0510	.0130	...	...	.0000	.0150	...	12.50	...	...	...	.60	...
	1897																			
49	Jan 19	...	...	...	...	...	...	.0610	.0210	...	...	.0000	.0058	...	11.70	...	...	5.8	.50	...
87	Feb 4	...	...	...	...	...	...	.0480	.0170	...	...	.0000	.0340	...	...	...	...	...	.65	...
109	9	...	...	...	...	...	...	.0600	.0000	...	...	.0000	.0247	...	...	...	...	...	.70	...
132	16	...	...	...	...	...	...	.0560	.0080	...	...	.0000	.0362	...	...	...	...	...	.65	...
167	25	...	...	...	...	...	...	.0520	.0070	...	...	.0000	.0725	...	...	...	...	...	.60	...
186	Mch 2	...	...	...	...	...	...	.0520	.0070	...	...	.0000	.0313	...	13.30	...	...	5.6	.70	...
224	10	...	...	...	...	...	...	.0510	.0060	...	...	.0000	.0280	...	...	...	...	...	.75	...
242	17	...	...	...	...	...	...	.0540	.0070	...	...	.0000	.0461	...	...	...	...	...	.70	...
273	24	...	...	...	...	...	...	.0560	.0000	...	...	.0000	.0280	...	...	...	...	...	.75	...
297	31	...	...	...	...	...	...	.0390	.0030	...	...	.0000	.0585	...	...	...	...	...	.75	...
333	Apr 7	...	...	...	...	...	...	.0660	.0010	...	...	.0000	.0198	...	12.40	...	...	6.3	.90	...
441	May 6	59°	clear	none	normal	...	none	.0540	.0010	...	...	.0000	.0379	...	14.40	...	...	6.6	.85	...
590	June 4	58°	clear	none	normal	...	none	.0540	.0060	...	...	.0000	.0420	...	12.60	...	...	5.8	.65	...
780	Aug 4	59°	none	v. slight	0.12	none	none	.0446	.0054	...	...	.0000	.0030	0.03	12.70	...	...	7.0	.62	.0370
950	31	59°	slight	v. slight	0.08	none	none	.0508	.0034	...	...	.0000	.0030	0.03	12.90	...	...	7.9	.61	.0630
1020	Sept 28	56°	none	none	0.07	none	none	.0470	.0046	...	...	.0000	.0050	0.06	13.40	...	...	7.9	.59	.0200

CHEMICAL EXAMINATION OF WATER FROM JAMECO PARK DRIVEN WELL PLANT, SHALLOW WELLS; TAP. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1897																			
50	Jan 19							.0680	.0400			.0016	.0593		17.70			4.6	3.05	
88	Feb 4							.0600	.0040			.0014	.0810						3.10	
110	9							.0510	.0050			.0010	.1217						2.95	
133	16							.0590	.0070			.0014	.1476						2.90	
168	25							.0550	.0040			.0014	.0851						2.85	
187	Mch 2							.0470	.0080			.0012	.0918		15.70				2.70	
225	10							.0490	.0050			.0000	.0749						2.35	
241	17							.0510	.0030			.0006	.0892						2.50	
334	Apr 7							.0560	.0120			.0010	.0517		13.70				1.85	
442	May 6	57°	clear	none	normal		none	.0460	.0050			.0000	.0445		13.80			6.0	1.80	
591	June 4	59°	sl. turb.	none	md. straw		none	.0430	.0030			.0008	.0379		13.90			6.7	1.70	
781	Aug 4	59°	slight	v. slight	0.05	v. faintly disagr'ble.	none	.0354	.0056			.0003	.0120	0.09	13.00			6.4	1.68	.1200
1021	Sept 28	56°	milky	slight	0.37	faintly unpleasant	none	.0400	.0052			.0005	.0330	0.10	14.00			5.6	1.64	.1000

CHEMICAL EXAMINATION OF WATER FROM BAISELEY'S DRIVEN WELL PLANT; TAP. (Parts per 100,000.)

No.	Date of Collection	Tem.	Appearance: Turbidity	Appearance: Sediment	Appearance: Color	Odor: Cold	Odor: Hot	Ammonia: Free	Ammonia: Albuminoid: Total	Ammonia: Albuminoid: In Solution	Ammonia: Albuminoid: In Suspension	Nitrogen as: Nitrites	Nitrogen as: Nitrates	Oxygen Consumed	Residue on Evaporation: Total	Residue on Evaporation: Loss on Ignition	Residue on Evaporation: Fixed	Hardness	Chlorine	Iron
	1896																			
18	Dec 22							.0026	.0014			.0000	.2944		31.30			6.7	9.50	
	1897																			
48	Jan 19							.0026	.0018			.0000	.2943		37.80			8.2	10.45	
85	Feb 4							.0014	.0024			.0000	.3612						10.70	
107	9							.0022	.0002			.0000	.3605						10.98	
130	16							.0024	.0022			.0000	.2780						11.20	
165	25							.0040	.0010			.0000	.3590						11.30	
184	Mch 2							.0024	.0040			.0000	.2939		40.70			6.8	11.25	
223	10							.0028	.0012			.0000	.2612						11.65	
243	17							.0030	.0004			.0000	.3599						11.45	
272	24							.0026	.0020			.0000	.0884						10.45	
296	31							.0016	.0020			.0000	.3769						10.95	
331	Apr 7							.0038	.0024			.0000	.3429		38.80			8.6	11.11	
439	May 6	55°	sl. turb.	none	normal		none	.0032	.0020			.0000	.1950		39.40			10.8	11.80	
588	June 4	54°	clear	none	sl. straw		none	.0036	.0046			.0000	.3194		40.30			8.5	10.50	
778	Aug 4	57°	v. slight	v. slight	0.12	none	none	.0024	.0048			.0002	.0700	0.05	42.80			13.0	13.20	.0180
948	31	66°	v. slight	v. slight	0.10	none	none	.0054	.0040			.0001	.0430	0.04	42.90			12.5	14.11	.0500
1017	Sept 27	56°	slight	v. slight	0.05	none	none	.0038	.0034			.0005	.0670	0.06	42.60			13.0	14.11	.0180

CHEMICAL EXAMINATION OF WATER FROM OCONEE DRIVEN WELL PLANT; WEIR BOX. (Parts per 100,000.)

No.	Date of Collection	Tem.	APPEARANCE: Turbidity	Sediment	Color	ODOR: Cold	Hot	AMMONIA: Free	ALBUMINOID: Total	In Solution	In Suspension	NITROGEN AS: Nitrites	Nitrates	Oxygen Consumed	RESIDUE ON EVAPORATION: Total	Loss on Ignition	Fixed	Hardness	Chlorine	Iron
	1897																			
1016	Sept 27	56°	v. slight	v. slight	0.10	faintly unpleasant	none..	.0362	.0048	....	....	.0000	.0000	0.04	15.50	....	....	9.5	0.50	.0230

CHEMICAL EXAMINATION OF WATER FROM SPRING CREEK DRIVEN WELL [OLD] PLANT SHALLOW WELLS; TAP. (Parts per 100,000.)

No.	Date of Collection	Tem.	Turbidity	Sediment	Color	Cold	Hot	Free	Total	In Solution	In Suspension	Nitrites	Nitrates	Oxygen Consumed	Total	Loss on Ignition	Fixed	Hardness	Chlorine	Iron
	1897																			
95	Feb 8	....	....	....	....	....	....	.0002	.0004	....	....	.0000	.5928	....	....	....	....	...	11.80	....
176	Mch 1	....	....	....	....	....	....	.0002	.0016	....	....	.0000	.6239	....	54.50	....	....	15.8	13.35	....
206	8	..	....	....	....	....	....	.0004	.0032	....	....	.0000	0570	..	....	....	....	...	13.30	....
313	Apr 5	....	....	....	....	....	....	.0000	.0014	....	....	.0000	.5141	...	55.60	....	....	16.4	8.65	....
423	May 3	54°	clear...	none. .	normal ..	....	none	.0000	.0016	....	....	.0000	.3788	....	59.50	....	....	16.3	15.35	....
570	June 1	56°	clear...	none...	normal ..	....	none	.0000	.0018	....	....	.0000	.2964	....	65.00	....	....	15.7	14.00	....
799	Aug 5	58°	none ..	v. slight	0.00	none....	none	.0024	.0044	....	....	.0000	.2250	0.06	70.70	....	....	29.5	23.32	.0000
968	Sept 1	56°	none .	none ..	0.00	none	none	.0010	.0026	....	....	.0000	.1850	0.05	74.50	....	....	27 0	26.26	.0080
1013	27	54°	none ..	none ..	0.00	faintly unpleasant....	none	.0012	.0040	....	..	.0000	.2650	0.07	83.80	....	....	29.5	28.22	0050

CHEMICAL EXAMINATION OF WATER FROM SPRING CREEK DRIVEN WELL [OLD] PLANT, DEEP WELLS; TAP. (Parts per 100,000.)

No.	Date of Collection	Tem.	Turbidity	Sediment	Color	Cold	Hot	Free	Total	In Solution	In Suspension	Nitrites	Nitrates	Oxygen Consumed	Total	Loss on Ignition	Fixed	Hardness	Chlorine	Iron
	1897																			
96	Feb 8	...	....	....	....	....	....	.0000	.0006	....	....	.0000	.0560	....	....	....	....	....	.50	....
177	Mch 1	....	....	....	....	....	....	.0000	.0011	....	....	.0000	.0740	....	16 80	....	....	9.1	.50	....
207	8	....	....	....	....	....	....	.0000	.0026	....	....	.0000	.0247	....	....	....	....	....	.50	....
314	Apr 5	...	....	....	....	....	....	.0002	.0012	....	....	.0000	.0287	....	17 30	....	....	10.6	.60	....
424	May 3	58°	clear...	none ..	normal ..	....	none	.0000	0014	....	....	0000	.0412	....	17.80	....	....	9.7	.60	....
571	June 1	54°	clear...	none ..	normal...	....	none	.0000	0000	....	....	.0000	.2141	....	18.60	....	....	11.5	.80	....
800	Aug 5	55°	v. slight	v. slight	0.10	none	none....	.0002	.0018	....	....	.0000	.0070	0.02	17.90	....	....	12.5	0.61	.0230
969	Sept 1	54°	sl. milky	v. slight	0.12	none	none....	.0006	.0016	....	....	0000	.0050	0.02	18.70	....	....	14.5	.68	.0270
1014	27	53°	sl. milky	v. slight	0.13	faintly unpleasant	none	.0012	.0024	....	....	.0000	.0120	0.03	20.00	....	....	13.0	.67	.0250

CHEMICAL EXAMINATION OF WATER FROM SPRING CREEK DRIVEN WELL [NEW] PLANT, SHALLOW WELLS; TAP. (Parts per 100,000.)

No.	Date of Collection	Tem.	APPEARANCE			ODOR		AMMONIA				NITROGEN AS		Oxygen Consumed	RESIDUE ON EVAPORATION			Hardness	Chlorine	Iron
			Turbidity	Sediment	Color	Cold	Hot	Free	Albuminoid Total	Albuminoid In Solution	Albuminoid In Suspension	Nitrites	Nitrates		Total	Loss on Ignition	Fixed			
	1897																			
97	Feb 8	…	…	…	…	…	…	.0003	.0015	…	…	.0000	8229	…	…	…	…	…	1.05	…
178	Mch 1	…	…	…	…	…	…	.0002	.0034	…	…	.0000	.5351	…	22.80	…	…	8.7	1.25	…
208	8	…	…	…	…	…	…	.0010	.0032	…	…	.0000	.5341	…	…	…	…	…	1.40	…
315	Apr 5	…	…	…	…	…	…	.0005	.0031	…	…	.0000	.5925	…	24.00	…	…	9.4	.75	…
425	May 3	53°	clear…	none…	normal…	…	none…	.0000	.0022	…	…	.0000	.2635	…	24.00	…	…	10.0	.75	…
572	June 1	55°	clear…	none	normal…	…	none…	.0000	.0004	…	…	.0000	.2141	…	24.10	…	…	10.9	.65	…
801	Aug 5	56°	none…	none…	0.04	none…	none…	.0008	.0024	…	…	.0000	.5700	0.01	22.70	…	…	13.0	1.40	.0000
970	Sept 1	54°	none…	none…	0.00	none…	none…	.0012	.0014	…	…	.0002	.6000	0.02	22.20	…	…	15.5	1.43	.0050
1015	27	55°	none…	v. slight	0.00	none…	none…	.0012	.0038	…	…	.0001	.6700	0.02	25.50	…	…	13.5	1.37	.0050

	Massapequa Weir Box		Wantagh Weir Box		Newbridge Weir Box		Merrick Weir Box		Clear Stream Pumping Station.		Forest Stream Pumping Station.		Jameco Park Artesian Wells.		Jameco Park Shallow Wells.		Baiseley's Pumping Station.		Old Sp. Creek Shallow Wells.		Old Sp. Creek Artesian Wells.		New Sp. Creek Shallow Wells.		Oconee Weir Box	
No. of Samples	4.		6.		2		6.		6.		6.		6.		5.		3.		4.		4.		4.		1.	
	below 5.	above 5.	below 5.	above 5.	below 5.	above 5.	below 5.	above 5.	below 5.	above 5.	below 5.	above 5.	below 5.	above 5.	below 5.	above 5.	below 5.	above 5.	below 5.	above 5.	below 5.	above 5.	below 5.	above 5.	below 5.	above 5.
Diatomaceæ																										
Eunotia																					1					
Cyclotella									1												1					
Cymbella	1		1		1																					
Epithemia	1																									
Melosira	1								1	1	1						1				1	1		1		
Meridion	1																									
Navicula		2	1	3		1		1	3		4		1		1						1					
Synedra	1						1	1										1			2	1	1			
Tabellaria	1	1		1		1	2	1													2					
Cyanophyceæ																										
Anabæna											1							1								
Oscillaria				5																	1					
Algæ																										
Closterium	1																									
Desmidium	1										1															
Pediastrum									1																	
Staurastrum									1																	
Spirogyra							1																			
Fungi	2		1	2			Ab. 1		Ab. 1	2	Ab. 2		2	1	Ab.	2	2	1	pres.		3					
Infusoria																										
Athophysa													1		1		1		pres.							
Dinobryon							1		2										1							
Dinobryon Cases									1		1															
Monas	1		1		1				1		1															
Synura							1																			
Chloromonas					1																					
Glenodinium							1																			
Amorphous Matter							Ab.				pres.										Ab.					
Vegetable Tissue			1				pres.																			

The organisms found in the waters of the driven wells are shown only as occurring so many times in quantities less than five, and so many times in quantities of five or more per c. c., in order to save space.

BACTERIAL EXAMINATION OF WATER FROM DRIVEN WELLS.

(No. per c c.)

Date	Massapequa	Wantagh	Newbridge	Merrick	East Meadow	Clear Stream	Forest Stream	Jameco Park Shallow Wells.	Jameco Park. Artesian Wells	Baiseley's	Oconee.	Old Spring C'k. Artesian Wells.	Old Spring C'k. Shallow Wells.	New Spring C'k. Shallow Wells.
December 7	...	...	...	...	...	cont	24	9	5	...	...	...	...	...
" 8	31	390	8	...	9	...	...	...	...	...	...	...	...	...
" 9	...	...	...	...	...	5	108	13	13	...	...	...	...	...
" 10	23	5	40	75	2	...	...		...	...	...	...	...	...
" 11	...	...	...	...	...	11	27	2	4	...	...	...	...	...
" 14	11	2	10	13	22	...	...		...	...	...	...	...	...
" 15	...	...	...	...	...	21	26	8	...	...	...	...	...	...
" 17	...	...	...	...	...	1	24	...	...	...	...	...	...	...
" 18	...	...	...	2	12	...	...		...	...	...	...	...	...
" 28	...	...	...	...	...	1	9	4	31	4	...	...	...	...
" 29	27	70	1	1	10	...	...	...	...	...	...	...	...	...
" 31	...	...	...	...	...	1	8	20	2	10	...	...	...	...
January 5	10	194	19	1	51	...	...	...	...	...	...	...	...	...
" 6	...	...	...	...	...	0	15	316	0	15	...	...	...	...
" 8	1	0	1	0	5	...	...	...	...	...	...	...	...	...
" 11	...	...	...	...	...	0	18	6	3	0	...	...	...	...
" 12	3	1	4	2	1	...	...	...	...	...	...	...	...	...
" 14	...	...	...	...	...	1	31	42	3	2	...	...	...	...
" 18	2	3	1	1	10	...	...	...	...	...	...	...	...	...
" 19	...	...	...	...	...	3	20	26	8	5	...	...	...	...
" 21	2	1	3	3	4	...	...	...	...	...	...	...	...	...
" 22	...	...	...	...	...	37	117	20	38	38	...	...	...	...
" 29	...	...	...	...	...	...	...	...	...	...	...	16	10	9
February 2	2	1	0	4	2	4	...	...	...	...	...	...	...	...
" 3	...	...	...	...	...	...	2	39	11	5	...	...	...	...
" 4	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" 5	...	...	...	...	2	...	...	...	...	...	...	...	...	...
" 8	1	2	3	0	0	...	...	...	...	...	...	cont	66	18
" 9	...	...	...	...	...	0	52	24	3	1	...	...	...	...
" 16	...	...	...	...	...	3	below 100	25	1	12	...	...	...	...
" 17	0	6	0	1	10	...	...	...	...	...	...	...	...	...
March 1	...	...	...	...	...	...	...	...	...	...	...	cont	38	3
" 8	...	...	...	...	...	...	...	...	...	...	...	365	90	0
April 5	...	...	...	...	...	...	...	...	...	...	...	16	52	3
" 6	27	3	...	2	...	...	...	...	...	...	...	...	...	...
" 7	...	...	...	...	...	15	100	235	29	11		...	...	...
May 3	...	...	...	...	...	...	...	...	...	...	...	98	4000	5000
" 5	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" 6	...	...	...	...	...	34	38	130	41	230	...	...	...	...
June 1	...	...	...	...	...	...	...	...	...	...	...	22	...	40
" 4	...	...	...	...	...	36	120	58	580	2	...	...	...	...
August 4	...	...	...	...	...	19	28	20	12	4	...	...	...	...
" 5	...	...	...	...	...	...	...	...	...		...	1800	260	2000
" 31	...	...	...	...	...	9	54	...	82	31	...	...	...	...
September 1	...	...	...	...	...	...	...	...	...	...	...	145	70	150
" 13	160	290	...	390	...	...	...	...	...	...	...	...	...	...
" 27	...	...	...	...	...	...	...	...	...	11	138	770	108	64
" 28	...	...	...	...	...	5	63	20	34	...	...	...	...	...
" 29	...	...	...	...	...	...	...	...	...	...	...	...	...	...
" 30	1	8	0	2	...	...	...	...	...	...	...	...	...	...
Average .... (Omitting figures in heavy type.)	10.0	8.5	7.0	7.6	10.0	10.3	44.7	27.4	17.7	8.2	...	204.5	87.0	36.0

BACTERIAL QUANTITATIVE RESULTS; OUTLETS OF SURFACE SUPPLIES.

Date	Massapequa Pond	Wantagh Pond	Newbridge Pond	East Meadow Pond	Hempstead Storage Res.	Schodack Brook	DeMott's Pond	Pine's Pond	Tanglewood Pond	Smith's Pond	Valley Stream Reservoir	Clear Stream Pond	Twin Ponds	Springfield Pond	Baiseley's Pond	Rain-fall for week	Rain-fall for month.	Millburn Pond	Millburn Pond. Extra Samples.	Millburn Pond. Extra Samples.	Millburn Pumping Station	Millburn P. S. Extra Samples.	Millburn P. S. Extra Samples
Week Ending																							
January 2	...	...	...	...	15	...	152	300	585	465	...	...	...	...	...	.00	...	365	...	...	41	...	...
" 9	290	173	365	510	...	...	...	...	...	...	...	...	...	...	...	0.81	...	570	325	585	197	445	285
" 9	625	385	295	635	50	...	235	510	430	610	2100	1060	1680	1340	309	.00	...	...	...	...	...	...	...
" 16	...	...	...	...	308	...	206	507	...	500	1000	1220	700	950	720	0.03	...	257	282	280	127	140	...
" 16	390	335	267	322	202	...	141	525	...	395	1130	925	770	Lost	1800	.00	...	...	...	...	...	...	...
" 23	415	164	207	324	...	...	...	...	...	...	8000	13400	48700	8600	17000	2.22	...	411	820	...	130	98	74
" 23	310	126	147	178	115	...	227	440	530	445	1235	Lost	550	1395	1500	.00	...	...	...	...	...	...	...
" 30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.08	4.14	...	...	...	...	...	...
February...... 6	...	...	...	175	353	...	72	915	...	398	...	...	...	...	...	0.32	...	245	304	338	76	101	76
" 6	423	223	153	273	341	...	128	340	665	227	1500	1485	1200	3000	1600	.00	...	...	...	...	...	...	...
" 13	380	178	188	665	400	355	43	5000	4700	905	2500	Lost	28800	13100	5200	1.89	...	381	490	...	196	198	516
" 20	305	240	250	1000	505	380	144	600	...	330	6700	2700	600	1700	400	T	...	310	...	...	105	90	...
" 27	...	...	...	...	...	...	...	...	...	...	...	...	...	4500	...	0.99	3.20	...	...	...	...	...	...
March 6	260	170	160	158	485	210	320	335	...	271	2100	1300	1000	1100	1500	0.66	...	430	...	...	121	110	...
" 13	208	194	250	158	Liq	400	470	200	...	7000	...	...	...	...	...	0.83	...	270	...	...	148	175	...
" 20	215	92	290	270	440	410	380	440	220	265	350	500	40000	450	2600	1.23	...	225	360	...	263	177	...
" 27	350	218	290	220	430	390	280	1300	210	360	460	6000	Cont.	14200	2200	0.64	3.36	320	...	...	240	...	...
April......... 3	...	...	...		...	...	...	...	...	...	...	...	...	1800	...	.00	...	176	310	...	...	...	...
" 3	210	160	210	177	88	285	118	195	230	250	300	800	1700	265	1400	.00	...		...	...	...	...	...
" 10	600	146	400	120	203	Liq	420	300	400	400	200	1200	600	700	600	1.96	...	400	...	...	46	240	...
" 17	415	282	250	180	400	300	400	800	240	400	185	1000	2300	4200	1400	1.16	...	180	800	...	250	200	270
" 24	170	210	140	95	120	800	280	1200	400	2600	125	1500	400	Lost	400	.00	3.12	150	180	...	230	110	...

BACTERIAL QUANTITATIVE RESULTS; OUTLETS OF SURFACE SUPPLIES—Continued.

Week Ending																							
May 1	140	175	130	196	210	200	164	2000	240	170	64	2500	1000	...	500	0.08	...	242	195	...	190	154	...
" 8	240	200	190	210	112	1100	115	700	1350	1700	280	480	3200	...	5200	1.40	...	370	2100	...	405	135	...
" 15	460	340	380	225	77	1300	270	900	1200	1400	2200	3900	9000	...	3200	3.01	...	750	500	...	175	210	...
" 22	Con	260	370	115	900	800	1100	90	250	180	3000	1400	700	...	220	0.36	...	700	..	...	540	.	...
" 29	820	220	210	160	52	490	250	153	240	900	130	350	700	...	1200	0.59	5.44	210	...	...	240	...	...
June 5	280	90	180	190	50	400	180	140	195	220	320	1500	3000	...	1400	2.08	...	220	...	..	130	...	...
" 12	350	135	170	450	260	600	3000	5500	3700	1700	Liq.	4200	16000	...	4000	1.73	...	Lost	...	...	110	...	...
" 19	210	80	110	170	65	200	180	90	130	180	110	1800	1800	...	45	T	...	150	...	...	85	...	...
" 26	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	0.21	4.02	...	...	..	...	...	..
July 3	...	...	...	...	...	-	...	...	...	...	.	...	...	...	...	0.88	...	...	...	...	...	...	...
" 10	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.00	...	..	...	...	...	...	...
" 17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4.37	...	. .	...	...	...	...	.
" 24	270	600	70	900	50	1000	220	300	600	700	600	120	1200	500	400	3.04	...	3000	...	...	200	...	...
" 31	Lost	1000	500	600	1500	500	300	500	300	700	6600	5000	2000	600	1100	2.90	11.19	1400	...	...	500	..	..
August 7	1000	1600	240	1800	70	400	500	800	500	1400	200	1200	400	5000	100	1.00	...	1200	...	...	400	...	
" 14	270	500	3600	1900	800	2900	900	800	11000	400	1000	3300	2300	900	95	0.34	...	1100	...	...	Lost	...	...
" 21	1000	600	2300	1600	700	600	500	400	800	1000	200	2100	350	1700	140	0.58	...	500	.	...	400	...	...
" 28	2500	400	80	2100	10000	3600	500	1600	600	900	800	2800	3800	1000	100	2.15	4.07	500	...	...	1700	...	...
September 4	1700	700	Con	800	800	400	400	700	700	600	400	2700	4600	200	700	0.70	...	800	...	..	1000	..	...
" 11	..	.	...	...	...	...	...	...	...	...	...	...	...	...	...	T	...	...	...	...	...	...	..
" 18	2500	1200	1200	300	700	2800	600	700	800	1300	800	1500	300	700	1300	.00	...	500	...	...	600	...	..
" 25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.20	1.90	...	...	...	...	...	...
October 2	270	1200	146	155	100	200	120	600	500	400	100	1700	1000	1200	600	.00	...	270	...	...	75	...	...

SUMMARY OF BIOLOGICAL QUANTITATIVE RESULTS ON RIDGEWOOD RESERVOIR.

TABLE

Week Ending.	Bacteria. (Per C. C.) Ridgewood Basin 1.	Ridgewood Basin 2.	Ridgewood Basin 3.	Microscopical Organisms. (Per C. C.) Ridgewood Basin 1.	Ridgewood Basin 2.	Ridgewood Basin 3.	Rain-fall for Week.
April ...24	135	....	90	4973	....	983	.00
May.. . 1	.. ..	....	.. .. ..	1664	54	1388	0.08
May.... 8	140	720	185	698	38	1209	1.40
May....15	200	155	85	974	113	2228	3.01
May... 22	80	150	85	1252	72	3604	0.36
May....29	70	160	200	6580	321	20440	0.59
June ... 5	120	180	260	7548	536	10980	2.08
June ...12	80	170	160	2608	1340	16067	1.73
June .. 19	80	115	90	7304	4740	8020	T
June . .26	... .	....	... .	....	... .	....	0.21
July .. 3	....	....	....	....	....	....	0.88
July .. 10	....	....	....	.. ..	.. ..	....	.00
July ...17	....	.. ..	....	20	211	9024	4.37
July ...24	220	155	120	352	114	1228	3.04
July ...31	3000	26500	6000	83	62	17	2.90
Aug ... 7	700	190	1100	266	58	31	1.00
Aug ...14	800	160	300	286	50	58	0.34
Aug ...21	400	600	300	447	15	37	0.58
Aug . .28	300	500	600	2538	55	25	2.15
Sept ... 4	100	15500	600	1230	39	68	0.70
Sept ...11	.. ..	.. ..	....	....	....	....	T
Sept ...18	800	200	200	5532	57	860	.00
Sept ...25	....	....	....	... .	....	....	1.20
Oct 2	Below 100	200	800	4444	354	1580	.00

MONTHLY AVERAGES ON SIXTEEN SURFACE WATERS.

TOTAL ALBUMINOID AMMONIA.

[Parts per 100,000]

	Massapequa Pond	Wantagh Pond	Newbridge Pond	E. Meadow Pond	Millburn Pond	Hempstead Storage Res.	Schodack Brook	DeMott's Pond	Pine's Pond	Tanglewood Pond	Smith's Pond	Valley Str'm Reservoir	Clear Stream Pond	Twin Ponds	Springfield Pond	Baiseley's Pond
Jan	.0047	.0042	.0048	.0054	.0085	.0043	. ..	.0061	....	.0108	.0050	.0122	.0083	.0030	.0055	.0118
Feb ...	.0062	.0038	.0056	.0049	.0052	.0056	.0054	.0074	.....	.0084	.0056	.....	.0048	.0055	.0073	.0132
March ..	.0076	.0067	.0074	.0087	.0072	.0073	.0101	.0084	.0206	.0069	.0078	.0086	.0087	.0061	.0123	.0151
April ...	.0130	.0096	.0113	.0095	.0086	.0161	.0071	.0119	.0119	.0073	.0091	.0102	.0126	.0065	.0168	.0300
May ..	.0211	.0122	.0120	.0111	.0103	.0225	.0129	.0187	.0193	.0141	.0133	.0155	.0219	.0128	.....	.0501
June....	.0243	.0183	.0174	.0184	.0090	.0213	.0108	.0218	.0129	.0107	.0153	.0191	.0162	.0138	. ..	.0897
July	.0322	.0235	.0237	.0241	.0237	.0194	.0122	.0220	.0177	.0117	.0132	.0212	.0147	.0156	.0346	.0779
Aug	.0153	.0149	.0134	.0166	.0120	.0154	.0076	.0178	.0118	.....	.0120	.0104	.0117	.0073	.0209	.0942
Sept....	.0079	.0110	.0069	.0104	.0137	.0162	.0079	.0143	.0082	.0091	.0105	.0099	.0106	.0084	.0145	.0954

BACTERIA.

(No. per c. c.)

	Massapequa Pond	Wantagh Pond	Newbridge Pond	E. Meadow Pond	Millburn Pond	Hempstead Storage Res.	Schodack Brook	DeMott's Pond	Pine's Pond	Tanglewood Pond	Smith's Pond	Valley Str'm Reservoir	Clear Stream Pond	Twin Ponds	Springfield Pond	Baiseley's Pond
Jan. ...	406	237	256	394	433	138	....	193	456	515	483	2293	4151	10280	3071	4266
Feb ...	369	214	197	528	345	400	368	97	1714	2683	465	3567	2093	9150	5575	2400
March ..	258	169	248	202	321	452	353	363	569	215	1974	970	2600	20500	5250	2100
April ...	349	199	250	143	314	203	462	305	624	318	913	203	1125	1250	1741	950
May. ..	415	239	256	181	633	270	778	380	769	656	870	1135	1726	2920	.. .	2064
June ...	280	102	153	270	185	125	400	1120	1910	1342	7[illegible]0	215	2500	6933	. .	1815
July	270	800	285	750	2200	775	750	260	400	4[illegible]0	700	3600	2560	1600	550	750
Aug ...	1193	778	1555	1850	825	2893	1875	600	900	3225	925	550	2350	1713	2150	109
Sept ..	2100	950	1200	550	650	750	1600	500	700	750	950	600	2100	2450	450	1000
Oct. ..	270	1200	146	155	270	100	200	120	600	500	400	100	1700	1000	1200	600

MICROSCOPICAL ORGANISMS.

(No. per c. c)

	Massapequa Pond	Wantagh Pond	Newbridge Pond	E. Meadow Pond	Millburn Pond	Hempstead Storage Res.	Schodack Brook	DeMott's Pond	Pine's Pond	Tanglewood Pond	Smith's Pond	Valley Str'm Reservoir	Clear Stream Pond	Twin Ponds	Springfield Pond	Baiseley's Pond
Jan....	7	3	10	109	28	25	....	....	85	.....	17	136	.. .	28	120	.....
Feb ..	8	1	2	.....	8	61	15	13	25	29	9	82	20	11	29	54
March ..	8	6	6	17	29	69	13	201	67	.. .	35	16	29	5	63	386
April ...	14	17	7	15	12	204	9	9	97	36	50	7	100	10	20	1245
May .	63	3	8	20	36	662	10	11	906	193	238	29	19	32	... .	4586
June....	14	2	20	4	14	43	8	14	151	43	29	19	13	22	... .	4154
July....	81	33	12	9	18	515	17	45	52	17	36	11	26	37	408	2134
Aug.. .	24	25	8	4	12	572	31	35	19	9	16	11	9	63	1136	6480
Sept....	32	33	5	11	16	649	13	28	3	6	11	10	15	30	188	4690
Oct.....	52	39	47	10	138	888	11	58	8	5	20	7	8	10	186	3380

ORGANISMS ASSOCIATED WITH ODORS FOUND IN THE PONDS OF THE BROOKLYN SUPPLY.

Showing Number of Times Found.

Quantities per C. C. found	Asterionella.		Tabellaria.		Meridion		Anabæna.		Volvox.		Eudorina.		Pandorina.		Uroglena.		Dinobryon.		Synura.	
	Five or more.	Less than five.	Five or more.	Less than five.	Five or more.	Less than five.	Five or more.	Less than five.	Five or more.	Less than five.	Five or more.	Less than five.	Five or more.	Less than five.	Five or more.	Less than five.	Five or more.	Less than five.	Five or more.	Less than five.
Massapequa Pond	...	1	4	6	2	8	...	1	...	...	...	2	...	1	...	2	7	3	...	...
Wantagh Pond	...	...	2	5	...	1	...	...	...	...	...	...	...	...	...	9	2	...	...	...
Newbridge Pond	...	1	1	6	...	1	...	...	...	1	...	...	...	...	...	...	2	3	...	...
East Meadow Pond	...	...	5	6	...	1	...	...	...	...	...	...	...	...	...	6	4	...	...	...
Millburn Pond	...	1	6	10	...	4	...	...	...	...	...	...	...	...	...	...	3	8	...	1
Hempstead Storage Reservoir	...	1	13	13	...	3	...	1	...	...	...	...	...	1	...	...	3	7	...	...
Schodack Brook	1	1	1	20	...	2	...	...	...	...	...	...	...	...	...	...	...	5	...	2
De Mott's Pond	...	...	6	8	...	4	...	...	...	...	...	...	...	...	...	...	3	7	...	...
Pine's Pond	2	1	9	9	1	4	...	1	...	...	...	...	...	...	...	1	5	9	...	1
Tanglewood Pond	...	1	6	11	...	3	...	...	...	...	...	...	...	1	...	1	2	4	...	...
Smith's Pond	...	...	8	17	...	6	...	1	...	...	...	...	...	1	...	...	9	11	...	3
Valley Stream Reservoir	...	...	4	5	1	3	...	1	...	...	...	...	...	...	1	...	3	7	...	3
Watt's Pond	1	...	1	6	1	2	...	...	...	...	...	...	...	...	...	...	1	...	...	...
Clear Stream Pond	...	...	1	14	1	10	...	1	...	...	...	...	...	...	...	...	...	3	...	3
Twin Pond	...	...	...	6	...	6	...	2	...	...	...	...	...	1	...	...	1	3	...	...
Springfield Pond	...	...	8	8	...	7	...	...	...	...	...	1	...	1	...	...	...	5	...	1
Baiseley's Pond	12	1	5	2	1	3	8	2	...	...	...	...	1	...	...	...	4	1	...	...
Ridgewood Reservoir—Basin No. 1	19	...	...	2	...	1	1	2	...	2	...	3	1	1	...	1	3	8	...	...
" " " No. 2	13	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	3	9	...	...
" " " No. 3	19	...	3	1	...	1	...	...	...	...	1	...	...	1	...	...	2	3	...	...
No. 108 De Kalb Avenue	9	...	1	1	...	...	...	1	...	...	...	1	...	1	...	...	...	2	...	...
Fourth and Atlantic Avenues	9	...	1	3	...	...	...	1	...	...	...	4	...	3	...	1	...	4	...	...